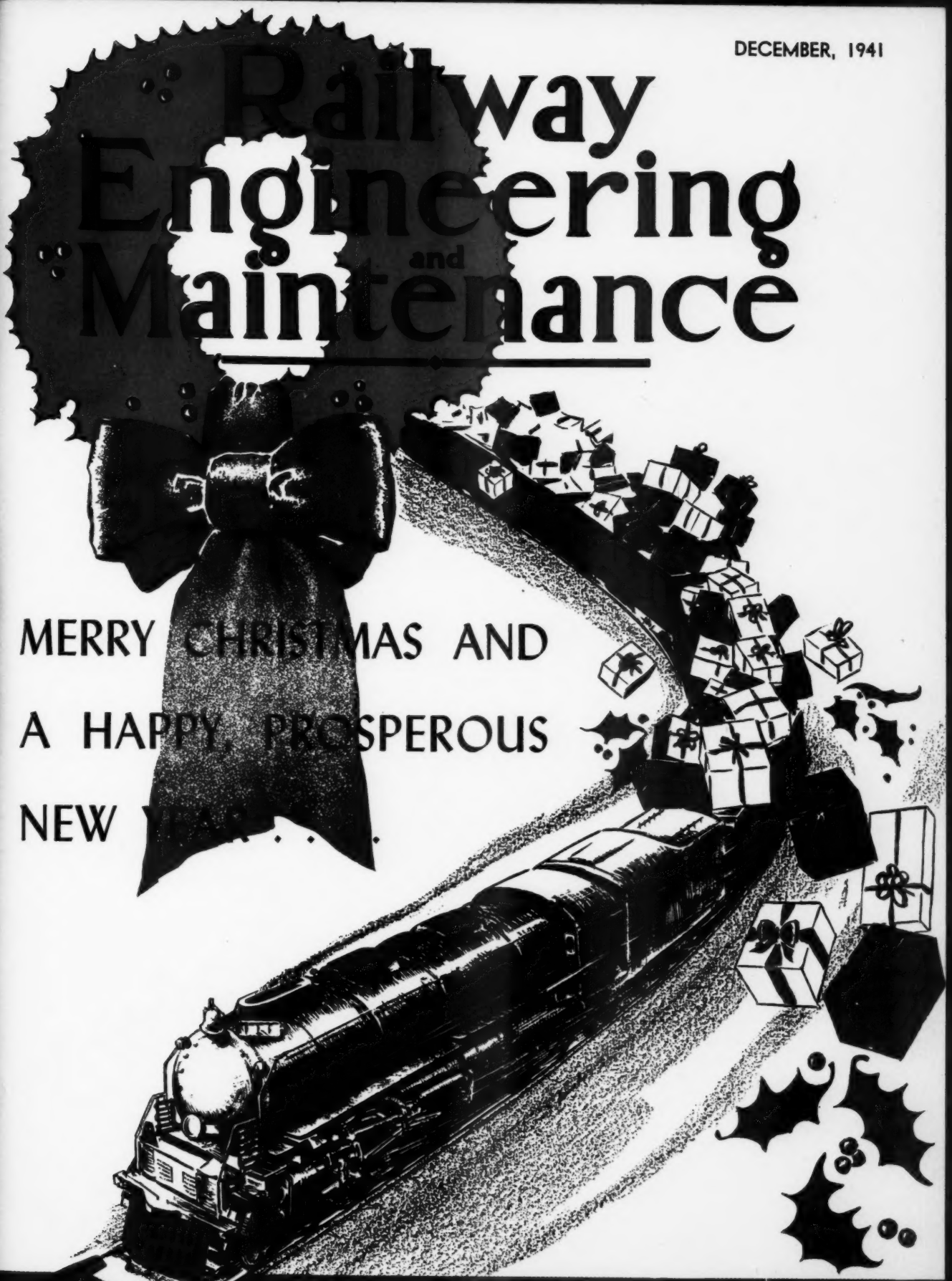
DECEMBER, 1941

Railway Engineering and Maintenance



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Eaton Manufacturing Company

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Published monthly by Simmons-Boardman Publishing Corporation, 105 W. Adams St., Chicago, Ill. Subscription price: United States and Possessions, and Canada, $2.00; Foreign, $3.00. Single copies 25 cents. Entered as second-class matter January 20, 1933, at the post office at Chicago, Ill., under the act of March 3, 1879, with additional entry at Mount Morris, Ill., postoffice. Address communications to 105 W. Adams St., Chicago, Ill.

Start fighting Winter now

Winter King Switch Heaters

IT won't be long before Winter looses its snow, sleet and freezing rain on America's railroads, a barrage of weather that can seriously tie up vital transportation facilities and delay distribution of defense materials—but needn't if you prepare to meet it now.

With Winter King Switch Heaters installed at key points, switches won't freeze up or be blocked by snow, sleet or ice. Winter Kings are designed for easy, economical installation and maintenance. Because they burn kerosene, they can be used where electricity, gas and steam are not available.

All openings are protected from cinders and dirt. Filling is easy and quick and can be done while the heater is burning. Refueling is required only every 9 to 15 hours during operation, depending on the adjustment of the flame. One man can service 100 or more heaters a day, enough for 10 to 25 switches.

To keep vital defense materials moving, start fighting Winter now. Order a supply of Winter King Switch Heaters for your system. They'll keep switches open easily even in the most adverse conditions at substantial savings over other methods.

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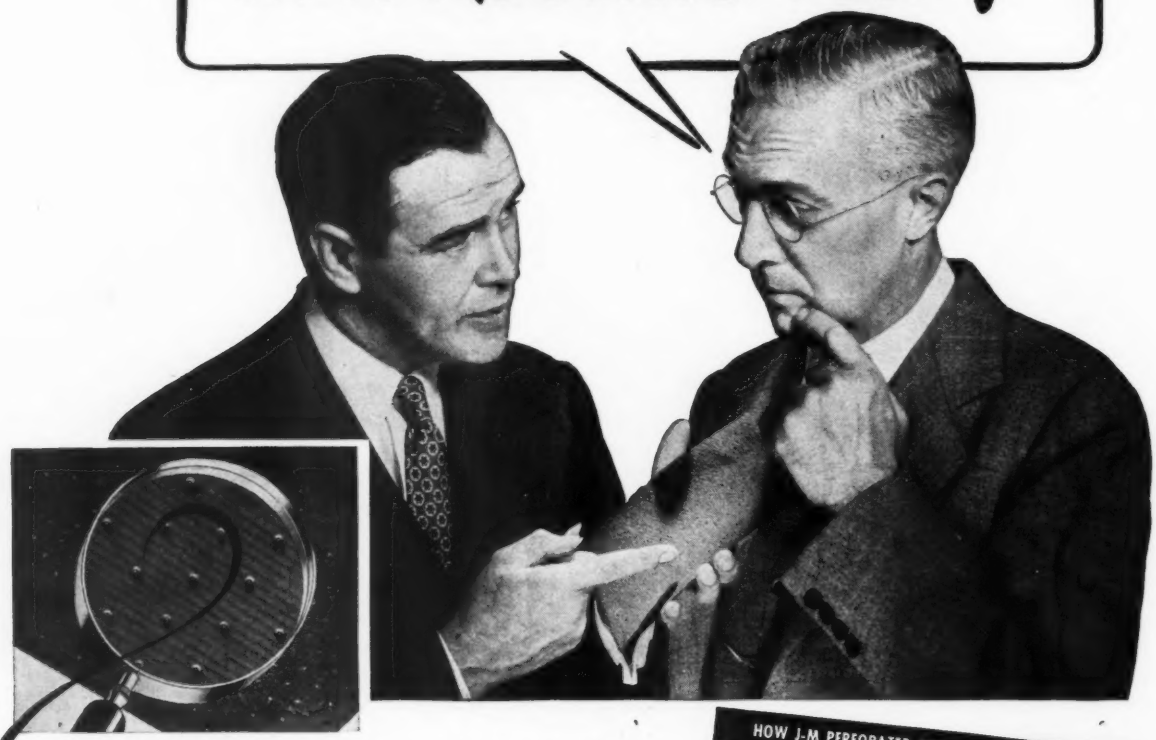
BETHLEHEM STEEL COMPANY

WHAT!...PUNCH HOLES IN A ROOFING FELT?



CERTAINLY!—Millions of tiny holes in J-M Perforated Asbestos Felts make a better roof—AND HERE'S WHY—

As J-M Perforated Asbestos Felts are laid, the tiny holes permit trapped air to escape. Result: No objectionable "air pockets"—blistering troubles practically eliminated! Yet when the waterproofing asphalt is applied, the holes are sealed and the roof is completely watertight.

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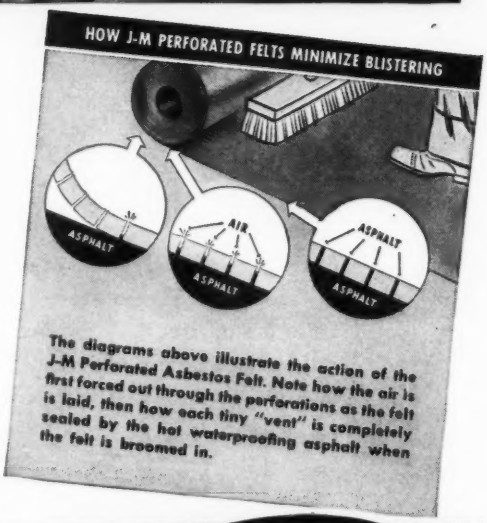
Like all J-M Asbestos Felts, the new J-M Perforated Felt forms a roof that is rotproof—that provides maximum protection against fire—that needs no protective coating to withstand the drying-out action of the sun. For complete details, write Johns-Manville at New York, Cleveland, Chicago, St. Louis, San Francisco.


HOW J-M PERFORATED FELTS MINIMIZE BLISTERING
ASPHALT
AIR
ASPHALT
ASPHALT
ASPHALT
The diagrams above illustrate the action of the J-M Perforated Asbestos Felt. Note how the air is first forced out through the perforations as the felt is laid, then how each tiny "vent" is completely sealed by the hot waterproofing asphalt when the felt is broomed in.

JM JOHNS-MANVILLE
Smooth-Surfaced
ASBESTOS BUILT-UP ROOFS

THE ROOF WITH THE SAFETY FACTOR

"All-Out" DEFENSE
AGAINST CORROSION

NO CORROSION DURING 8 YEARS

The above illustration shows the splice removed 8 years after packing with R.M.C. Plastic. Note that rail, joint bar, bolts, and nuts are completely free from corrosion.

R.M.C. Plastic Prevents Corrosion
LUBRICATES--PROTECTS RAIL JOINTS

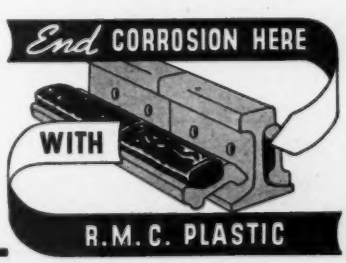
One application of R.M.C. Plastic provides, at very little cost, *life-long protection* for rail joints from corrosion.

"Frozen" joints, the cause of kinked and humped track, are permanently eliminated . . . as the combined lubricating and corrosion-preventing action of the plastic permits proper expansion and contraction of the rails at all times.

This free, equalized movement of the rails prevents the development of extra-wide openings between rail ends, the main cause of destructive rail-end batter.

The use of R. M. C. Plastic NOW will increase the life of your present rails, will provide better, smoother-riding track and reduce year-around maintenance expense.

Molded blocks of R. M. C. Plastic are placed on the inner faces of the joint bars before they are bolted to the rail, the bolting action solidly packing the plastic into every section of the joint assembly.



RAILWAY MAINTENANCE CORP.
PITTSBURGH, PENNSYLVANIA

RACOR Switch Point Lock

SAFE—COMPACT—EXTRA HEAVY

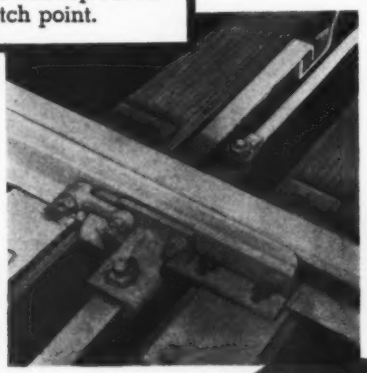
Located below the top of the tie, the mechanism of the new Racor Switch Lock is entirely separate from the stand and completely protected. Even if the stand is knocked down, the lock will still function.

Furthermore, the locking rod clamps directly to the switch point and the padlock cannot be inserted unless the switch is properly closed. Simple adjustment permits accurate setting.

These features, together with the extra-heavy construction, provide complete protection for the switch against failure or even destruction of any part of the switch stand or its connections.

The lock can be readily installed and the convenient treadle release does not delay opening of switch.

Point attachment showing locking rod clamped to switch point.



Style 3912 for Ground Throw stands. Note that one padlock provides positive locking and prevents raising of hand lever.

Style 3911 for high stands — normally padlocked as shown but hand lever may also be padlocked or simple interlocking means provided.

RACOR

RAMAPO AJAX DIVISION

THE AMERICAN BRAKE SHOE & FOUNDRY CO. • 230 Park Ave., New York

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Fairmont RAILWAY MOTOR CARS

Performance ON THE JOB COUNTS

"FOR fast, *safe* transportation—go by train!" Since the advent of streamliners, more travelers than ever have been heeding this suggestion. The high speeds of these modern trains are *safe* not only because of improvements in equipment but because of the rigid standards of inspection which are maintained for signals, tracks, and right-of-way. For the men who are charged with this important responsibility, Fairmont provides a line of railway motor cars to meet every hauling requirement. Through superior performance under all conditions of service over a period of 31 years, Fairmont Cars have become the preferred equipment for dependability, safety and economy. Of all the cars in service today, more than half are Fairmonts. Fairmont Railway Motors, Inc., Fairmont, Minnesota.

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One to Six Men. 1200 Lb. Load Capacity

OF ALL THE CARS IN SERVICE TODAY . . . *MORE THAN HALF ARE FAIRMONTS*

FAIRMONT M9 SERIES D, 1 to 2 man inspection car

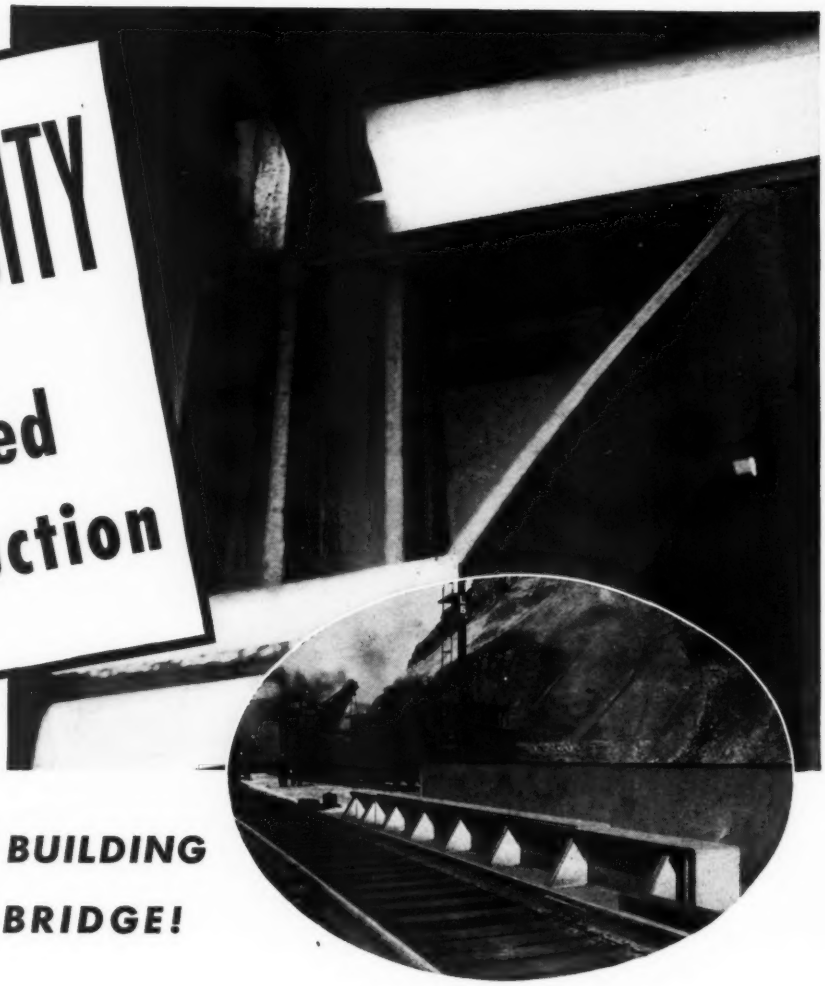
FAIRMONT M14 SERIES E for all light section service

FAIRMONT S2 SERIES E in standard section work

FAIRMOUNT 57 SERIES D car in signal maintenance work

FAIRMONT M19 SERIES D in track supervisor's service

SIMPLICITY OF welded construction



...Speeds BUILDING OF RAILROAD BRIDGE!

Replacing an old railroad bridge quickly so as to minimize traffic delay was a real problem here, but one which was solved with complete satisfaction — thanks to welded construction. While field operations necessary to release the old bridge and support its replacement were under way, *welding permitted the new girder span to be completely fabricated and assembled in the shop.* The new structure was then transported to the site of erection, rails were cut, the old span hoisted away, the new one lowered into position and the tracks reconnected. Just 5 hours after traffic was halted, the new bridge was placed in service.

All of the welding in both shop and field was done with Airco Shielded Arc Electrodes. Airco is equipped to supply everything needed, including engineering assistance, to insure the proper application of the oxyacetylene and electric arc processes so that they will be most effective wherever used. Further information will be gladly supplied on request. Simply address a request on your business letterhead to any Air Reduction office.

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2. Built-in spirit level, convenient to operator, shows when cutter head is correctly adjusted for attaining level tie-seats.
3. Adjusting screw readily maintains truck wheels at any desired angle with rail.
4. Cutter head quickly adjusted to properly adz ties for different tie plate centers.
5. Improved guide rollers hold machine in gauge when working through crossings.
6. Simple adjustment for tightening belt. Idler pulley has now been eliminated.
7. Easily lifted off and on track by rail crane from a balanced hitching point.
8. Stand provided for supporting machine when cutter heads are being changed.

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NORDBERG MFG. CO. MILWAUKEE WISCONSIN

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No. 156 of a series

Railway Engineering and Maintenance

SIMMONS-BOARDMAN PUBLISHING CORPORATION

105 WEST ADAMS ST.
CHICAGO, ILL.

December 1, 1941

Subject: His Own Copy

Dear Reader:

"Your editorials are so written that a man without a college education can read them. The information presented therein, together with your Questions and Answers Department, make Railway Engineering and Maintenance valuable to foremen out on the line, as well as to their supervisory officers. We make it a point to see that those of our men who display interest in these matters have opportunity to read the magazine, for we who subscribe send our copies out to foremen whose names are given us by their roadmasters, who then follow this procedure up to insure that the men profit from it."

The above quotation from a letter that I received a few days ago from the vice-president of a small but active railway pleased me greatly, for it showed that this officer and his associates appreciate the value of the information published in our columns to the practical man on the job. On other roads the same result is accomplished by roadmasters or their railways subscribing for several copies for each roadmaster, one of which is retained for the personal use of this officer while the others are circulated among the foremen according to a pre-arranged plan of rotation. Not a few roadmasters then take the additional step of discussing articles in these issues with their foremen in group meetings or in individual conversations to see that these men get the maximum benefit from the publication.

We are delighted with these measures for sharing copies of our publication with fellow employees, for it multiplies our readership. As a matter of fact, surveys that we have made from time to time indicate that our total readership approximates four times our total paid subscribers. Gratifying as these measures are, however, I believe that you will concur in the thought that the officers referred to above would profit still further by insuring, through railway or individual subscriptions, that each of their supervisory officers, including roadmasters and supervisors (of bridges, buildings and water service, as well as track) has his own personal copy of the magazine which he can carry with him, read as opportunity arises and then preserve or clip as best meets his own personal needs, and that provision also be made for each foreman, or at least the more alert, to also receive the magazine. This is a practice that has been followed by a number of roads; and it is not without significance that, without exception, they report the outlay well warranted.

In all these considerations we admit that we have a selfish interest. We feel, however, that if we are doing a constructive educational job for maintenance men, from the top down to and including foremen, as you tell us so frequently, this work should be made available to the maximum number of your men. I remind you that the cost, on the basis of a two-year subscription, is only 12 1-2 cents per copy per month.

Yours sincerely,

Elmer T. Howson

Editor

ETH:EW

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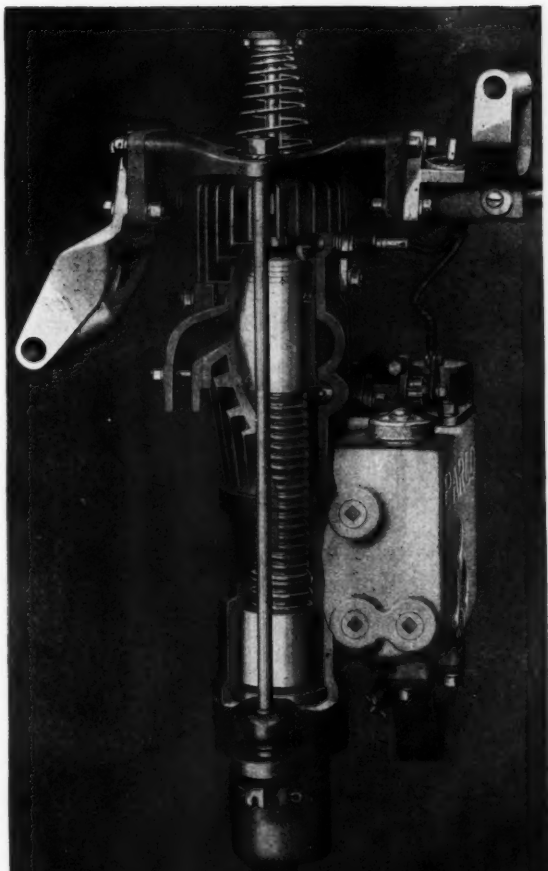

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FOR 1942

Entirely self-contained—no auxiliary equipment necessary—Can be quickly assembled for gang tamping, or readily distributed for spot tamping. The advantages are obvious—All equipment off track—More time on the Job—Maximum Production—Cost Reduction and the kind of track to meet modern requirements.

The initial cost is lower, and year around performance in tamping, crib busting and ice breaking gives more day's operation per year.

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BARCO

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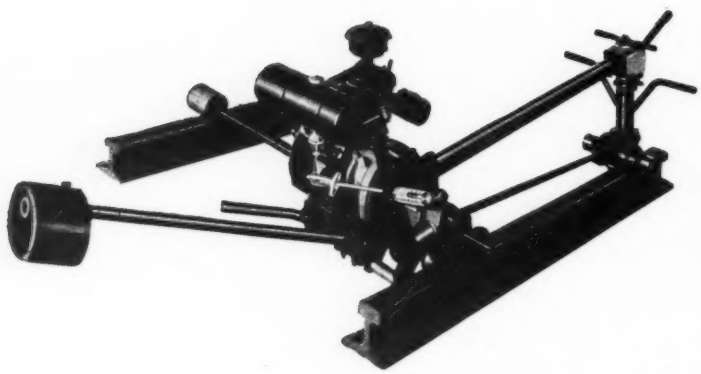
Lightweight
Accurate
Dependable
Fast



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Main Office
137 East 42nd Street
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New York

Published on the first day of each month by the

SIMMONS-BOARDMAN PUBLISHING CORPORATION

105 West Adams Street, Chicago

NEW YORK
30 Church Street

CLEVELAND
Terminal Tower

WASHINGTON, D.C.
1081 National Press Bldg.

SEATTLE
1038 Henry Bldg.

SAN FRANCISCO
550 Montgomery St.

LOS ANGELES
Union Bank Bldg.

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Subscription price in the United States and Possessions, and Canada, 1 year $2, 2 years $3; foreign countries, 1 year $3, 2 years $5. Single copies, 35 cents each. Address H. E. McCandless, Circulation Manager, 30 Church Street, New York, N.Y.

Member of the Associated Business Papers (A.B.P.) and of the Audit Bureau of Circulations (A.B.C.)

PRINTED IN U.S.A.

Railway Engineering and Maintenance

NAME REGISTERED U. S. PATENT OFFICE

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Unit of Union Carbide and Carbon Corporation
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Railway Engineering and Maintenance

Success

Railways Pass Fall Traffic Peak

FOR years it has been common knowledge that the railways are called upon to handle the maximum demands of traffic during the fall, the peak usually occurring in the second or third weeks in October. By reason of this fact, concern was expressed by certain persons high in public life early in the summer regarding the ability of the railroads to meet the added demands of defense traffic this fall; in fact their forebodings were so dire as to forecast a near-breakdown in transportation.

Because of the prominence of their positions, these statements created so much concern in many quarters that it became a special responsibility of the railways to so conduct their operations as to demonstrate the fallacy of these fears by meeting all demands for service. This the railways have done and, with the seasonal peak of traffic now definitely passed, it is possible to review the measures that contributed to this achievement for they constitute another outstanding demonstration of the resourcefulness and the ability to meet emergencies that are latent in the railway industry, awaiting only the call of necessity.

A Record Traffic

That this achievement of recent weeks has been no mean one is evident when one recalls the frequency with which the fear was expressed last spring that we were facing another collapse of transportation such as occurred in the early winter of 1917. Yet we are now definitely beyond the seasonal peak, for the car loadings have now decreased week by week from the high of 922,884 cars loaded in the week ending October 18, and we have had no shortage in transportation.

But car loadings by no means tell the full story of this achievement today because of the greatly increased utilization of cars that now prevails. This is shown by the fact that, while the number of cars loaded in the peak week this year was nearly a fourth less than the number loaded in the week of highest loading in 1929, the ton miles of freight handled during recent weeks was actually larger than in 1929, and on some roads has been as much as 40 to 50 per cent larger.

This is an achievement that is scarcely realized, even among railway men. And it is even more astounding when it is realized that the railways have performed this service with 590,000 fewer freight cars and nearly 16,000 fewer locomotives.

Defense Service

Also in these days of epoch-making national defense activities, it may be pointed out that, since the fall of 1940, the railroads have delivered an average of 5,000 car loads of materials every day to government defense plants, camps and other projects without, in the words of high defense officers, "a single one of these projects having been delayed as the result of any failure in transportation."

Equally significant is the record made in the handling of traffic through our ports. In New York, for illustration, the average unloading of export and coastal freight has increased from an average of less than 500 cars per day in the early months of 1939 to more than 1200 cars per day at the present time. A measure of the magnitude of this achievement is afforded by the fact that an average of only 1350 car loads of freight were delivered to boats at New York each working day during the height of the World War in October, 1918.

And it will be recalled that, following the transfer of 50 tankers from coastwise to British service last summer and the attempt of a cabinet officer, born of hysteria, to build a pipe line from the oil fields of Texas to the North Atlantic seaboard with public funds to meet a threatened shortage of oil, the railways stepped in with added service of such efficiency as to demonstrate the folly of this construction and the "emergency" was officially declared at an end a few weeks ago.

More Equipment

How have they made this record? This answer is to be found in several directions. In the first place, they have reduced the number of cars and locomotives awaiting repair to all-time lows. From October 1, 1939 to October 1, 1941, they reduced the number of cars awaiting repairs 121,871, bringing the percentage to 4.4 of total ownership. Likewise, in these two years they reduced the number of locomotives awaiting repairs by 4,097, bringing this proportion to 9.9 per cent of their ownership. In these same two years, the railways placed

in service 131,078 freight cars and 962 locomotives. As a result, after deducting retirements, they increased their ownership of available freight cars by 31,732, thereby increasing the number of cars available for service by 153,603. In these two years, there was a reduction of 1,365 locomotives owned but the reduction in the number held awaiting repair resulted in a net increase of 2,732 serviceable locomotives.

More specifically, the railways placed 64,680 new freight cars in service in the first 10 months of 1941 and on November 1 they had 80,504 additional cars still on order and undelivered. Likewise, they placed 493 new locomotives in service prior to November 1 of this year and had 611 more on order. These orders, incidentally, are part of the program which the railways have set for themselves to bring their freight car ownership up from 1,675,630 on October 1, 1941 to 1,800,000 on October 1 of next year.

Public Acclaim

Because of these activities, it is not surprising that such a close student of railway activities as Congressman Clarence F. Lea, chairman of the Committee on Interstate and Foreign Commerce of the United States House of Representatives, should say that "our transportation system is, unquestionably, the best the world has produced. We have a railroad management that was schooled in our transportation difficulties in the World War, and trained in efficiency under the pressure of unfavorable economic conditions and the keen competition of the last two decades. In all the world, no job is being done better today than by the American railroads."

And no less an authority than Joseph B. Eastman, chairman of the Interstate Commerce Commission, stated, in a recent address, that "the railroads have done a splendid job so far. We have had no occasion whatsoever to exercise the emergency powers of the Commission, and we hope we won't have occasion to exercise them. The railroads have shown, in what they have done, what improvements have been made in railroading in the past several years. They are handling with less cars now, traffic as heavy as was handled in 1930, and it is mounting and drawing up to the 1929 level."

This is the record which the railways have made during the period of maximum traffic—the most critical period —of the year. It is a record in which every railway employee may take pride for he helped make it. It is a record which he can also bring to the attention of others in order that there may be more universal appreciation of the value to the public of an efficient system of railways, well built, well maintained and well operated, by a staff that is schooled in facing emergencies as they arise and taking them in stride.

Maintenance

Must Go On During the Winter Months

MAINTENANCE of way and structures men have just come through the most intensive working seasons for more than a decade, and those who have joined the ranks during the last 10 years have been railroading at its peak, with total expenditures for maintenance of way and structures work for the first nine months of the present year rising to more than 430 million dollars, the largest for this period since 1930, and exceeding those for the like period of last year by nearly 57 million dollars. The sudden turn of events in Europe in 1940 and their repercussions upon our national defense and aid to those resisting aggression have changed the entire railroad picture. From an industry accused only recently of being outmoded and over-expanded, the railways are today recognized as vital to our industrial and defense efforts and have already been called upon to handle a traffic, measured in ton miles, exceeding that of even the peak year of 1929.

Few realize the burden that this has placed upon maintenance of way and structures men, many of whom, when called upon to meet this situation, found themselves handicapped by a sizable backlog of deferred maintenance arising out of the depression years. But, recognizing that the transportation services of the railways cannot be more dependable than their tracks and bridges, and, in many cases, the adequacy of their buildings, maintenance had to be brought into step—and that is what has been under way. As a result, on many roads, more rail has been laid, more ties have been replaced, larger programs of ballasting and surfacing have been undertaken, ballast cleaning, long deferred on many roads, has been resumed, and programs of roadbed drainage, ditching and bank widening have been undertaken on a larger scale than in many years.

As the result of all this effort, in which work equipment has played a more important part in increased production and efficiency and in the quality of work performed, than ever before, remarkable results have been achieved, of which maintenance men may justly be proud. But large and effective as these results have been, there is still much to be done, not only during next year's working season, and as long thereafter as the present state of national emergency exists, but during the remaining days of the present year and the coming winter months. In the face of this situation and the prospects of continued heavy traffic, with still larger maintenance programs in prospect for 1942 to keep pace, the winter months ahead for the maintenance forces should not be months of curtailed or seriously restricted activity, with largely reduced forces, but rather, the most intensive winter months experienced for many years.

Every maintenance officer knows that there are many classes of maintenance work that can be carried out effectively during the winter, even in climates of considerable snow and cold, and, to a large extent, it has only been because of necessarily restricted programs, and, in fact, the difficulty of employing full-time forces during even the summer months in recent years, due to depressed earnings, that winter work, other than essentials that could be carried on with skeleton forces, has been out of question and out of mind. But this

situation has changed radically, and the maintenance officer who does not reorient his thinking in this regard just as radically is certain to find himself at a serious disadvantage next spring when he will be confronted with the problem of rebuilding his forces from a depleted labor market, and will be faced with much routine maintenance work that will cut seriously into the time available for programmed maintenance operations.

Wise maintenance officers will not be caught in this predicament, will impress the seriousness of the consequences of such a course upon their managements, if necessary, and will carry forward this winter every possible phase of track and structure maintenance to the end that they can face the heavy working season of next year with the best prospects for keeping pace with the demands that will be made, in spite of the increasing difficulties that can be expected in obtaining adequate labor, equipment and materials.

Mechanization

Is Gaining Momentum Rapidly

FOR a decade the maintenance-of-way department has been learning the intrinsic meaning of conservation as it applies to both labor and material, and of so-called economy of expenditures, primarily because revenues were so depleted that funds have not been available to purchase the materials required to make replacements as freely as had been done during the twenties. Likewise, labor has been lacking to do many of the tasks that had been considered routine necessities during the previous decade. In fact, so severe were the reductions in expenditures that, during the depth of the depression, one maintenance officer said whimsically that "I have learned to save a dollar when I haven't that much to start with."

Despite unparalleled reductions in force and the severe restrictions placed on purchases, the demands made on tracks and bridges have increased beyond anything that had been considered possible, or even thought of, prior to the depression. To meet those demands, under the pressure of extreme necessity, maintenance officers and men alike have developed many new methods of doing work at lower cost, and have adapted other methods and equipment already available to the same purpose and to increasing the service life of materials in use. One of the outstanding examples of these adaptations is the sudden expansion of rail-end welding and the building up of rail joints to extend the life of rail.

Perhaps the most beneficial lesson that was learned from the depression was the intrinsic value of power machines and tools for practically every operation in maintenance. Work equipment was not new to maintenance officers, for at the onset of the depression power machines were in widespread use. Strangely enough, however, despite their demonstrated value on those roads that were using them, not a few otherwise progressive officers could see no advantage in using these machines on their own roads, while others were satisfied that one or two units each of a few types were all that they would ever need. Even those roads that were best equipped did not appreciate the possibilities of mechanization as they have come to do through the tribulations of the lean years.

This viewpoint has changed, and today even those officers who were most conservative are eager to buy a wide variety of machines to the limit of the funds available to them. Meanwhile, manufacturers have not been idle. They have not only improved the equipment they were already producing, but have also brought out new designs to meet new needs or needs that were formerly dormant, so that today the maintenance officer has a wider range of equipment than ever before from which to choose.

Suddenly increased revenues have eliminated some of the restrictions imposed on maintenance expenditures and have eased others. With these limitations removed or relaxed, railway officers are applying the lessons they have learned in the school of adversity and are acquiring new units of work equipment at a rate that is exceeding all previous records. With the prospect that traffic will continue at a high level, there are numerous indications that next year will set a new record in the purchase of power machines and tools. For this reason, the recent exhibit of equipment and materials at the Roadmaster's convention and the similar exhibit at the Bridge and Building convention, were timely, for they gave those officers who attended the meetings an opportunity to crystallize their ideas with respect to the kinds and makes of machines and tools they will desire to include in their forthcoming budgets.

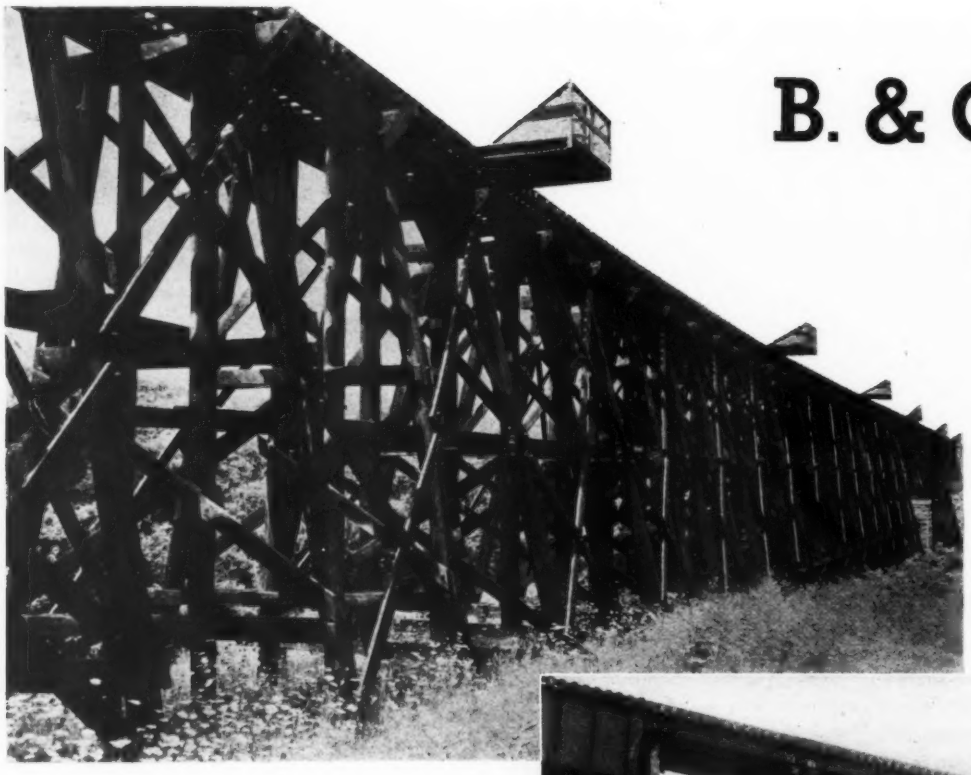
Grade Crossings

Can Be Very Hazardous in Winter

IN recent years as both train and highway speeds have increased beyond the wildest expectations of a few years ago, and as hard roads have greatly increased the density of highway traffic, the grade crossing has assumed a place of importance that no one of that relatively recent period ever dreamed would be possible. While there are many aspects to the maintenance of a highway crossing at grade, winter requirements and the prevention of accidents during this season are of special concern now.

Probably the most difficult problem facing maintenance forces is the packing of the flangeways. Automobiles and trucks drag snow and soil onto the crossing and crowd them into the flangeways so tightly that derailments have resulted. This situation is often aggravated by the practice of some highway departments of running snow plows across railway tracks, with no notice to the railway or the local maintenance forces. When the railway runs a snow plow, it is customary for the section forces to level down the bank of snow thrown up along the track. The highway snow-fighting equipment sometimes pile high ridges of snow on either side, making no effort to level it down or clear it off the tracks. These plows also drag and pack snow into the flangeways, which may freeze hard enough to lift wheel flanges over the rail. These facts demonstrate the importance of giving close attention to keeping the flangeways of crossings clean, particularly during and after a severe snow storm.

B. & O. Pre-Large



Left—Twenty-Four Pre-Framed Creosoted Frame Bents Were Installed in the East Approach. Below—The Multiple Bents At One End of the Main Span Illustrate the Unusual Height of the Structure

Measured by the height of the structure, the scope of the work, and the thorough manner in which the new timber-frame bents were preframed and bored before treatment, the reconstruction of a portion of the Antietem Creek bridge of the Baltimore & Ohio on its Washington County branch constituted an undertaking of unusual interest. Details of this project, including the nature of the old and new construction, the method of pre-framing and the procedure in the field, are given in this article

THE recent reconstruction in part of timber-trestle approaches of unusual size and height for a bridge on the Baltimore & Ohio affords an outstanding example of the application of preframing on a large scale. The structure involved has a maximum height of 75 ft. 3 in., measured from the stream level to the top of rail, and is one of the highest bridges involving trestle construction on the B. & O. Moreover, its partial reconstruction involved what is probably one of the largest single jobs of preframing yet undertaken on this road. As a measure of the size of the project, it entailed the framing and treating with creosote of approximately 236,400 f.b.m. of timber.

The structure under consideration is Bridge No. 31 on the single-track Washington County branch, which spans Antietem creek at a point near Keedysville, Md. This line extends from Weverton, Md., a point on the main line about 52 miles west of Washington, in a northwesterly direction to Hagerstown, Md., and is about 27 miles in length. The bridge at Antietem creek, which lies in a deep wide ravine, has a total length of 766 ft. and consists of a central span across the creek, flanked by timber-trestle approaches.

Originally, the central portion of the bridge consisted of a timber deck-

Frames and Treats Bridge Approach Trestle

truss span carried on masonry piers. In 1909, this truss was removed and was replaced with an 84-ft. deck plate-girder span, supported at each end on a double timber-frame bent. Since the plate girder span is somewhat shorter than the timber truss span that it replaced, it was necessary to extend the trestle approaches to make up the difference; at the easterly end of the main span the distance between the end of the girder span and the center line of the masonry pier is 45 ft. 6 in., while at the west end this distance is about 39 ft. The masonry piers were left in position, being used as foundations for the timber bents that coincided with them.

Thus, as the bridge was constituted prior to the recent renewal work, it was comprised of the 84-ft. main span, flanked by timber-trestle approaches at both ends, that at the east end being about 447 ft. long and that at the west end being approximately 235 ft. in length. These trestles were of untreated timber-frame construction; consequently, in recent years, the cost of keeping them in repair had reached excessive proportions. Several years ago a start was made toward the correction of this situation when about 96 ft. of the easterly end of the east approach and 35 ft. at the westerly end of the west approach were renewed. At these locations conditions were suitable for the use of timber-pile construction, with the result that these portions of the structure were entirely rebuilt with creosoted pile-trestle construction, a total of nine bents being involved at the east end and three at the west.

Another Consideration

Shortly after this work was carried out, a decision was made that had the effect of making even more imperative the desirability of improving the situation at this bridge site. It was decided to take such steps as would be necessary to permit the Washington County branch to be used as a part of a detour route in the event that a traffic stoppage should occur on the main line between Weverton and Cherry Run, W. Va., a point about 35 miles west.

It was evident that, in order to permit main-line equipment to be routed over the Washington County branch, it would be necessary, among other things, to strengthen the approach trestles of the bridge across Antietem creek. Accordingly, authority was obtained to reconstruct the remainder of the easterly approach and that portion of the westerly approach between the old masonry pier and the main girder span. It is the work that was involved in reconstructing these portions of the bridge with which this article is primarily concerned. The remainder of the westerly approach was not involved in this work, the renewal of this portion of the structure being left for completion at a later date.

New Construction

In the reconstruction of those portions of the trestle approaches mentioned above, the railroad's standard timber frame-bent construction, with the bents supported on concrete pedestals, was employed, except that steel-beam spans, with frame-bent supports, were introduced to span between the ends of the main girder span and the old masonry piers. The rating of the trestle design that was used is equivalent to Cooper's E-55 loading. Frame-bent construction was

Looking West Along the Reconstructed Portion of the East Approach

chosen for this installation because of the extreme height of the structure and also because the problems of installation would be simplified as compared with those that would be entailed if pile-trestle construction were employed, necessitating the driving of piles under traffic. Moreover, beyond the ninth bent from the easterly end bed rock was encountered at a relatively shallow depth; hence it would have been difficult to obtain satisfactory penetration with driven piles.

The reconstructed portion of the bridge has 12-ft. panel lengths, and it was possible to locate all but a few of the bents in the clear of the existing construction; thus in only one or two cases was it necessary to resort to the use of falsework in carrying out this project. Four-post bents are used in the new construction except for those under the ends of the main span, which have six posts each. All posts consist of 12-in. by 12-in. timbers, and the two outside members of each bent have a batter of 3 in 12. The sills are also of 12-in. by 12-in. members, while the caps are 12 in. by 14 in. The sash and sway bracing and the longitudinal bracing are of 3-in. by 10-in. pieces, while the girts are of 6-in. by 10-in. timbers. Three-ply 8-in. by 16-in. stringers are used, which are carried on three-ply 8-in. by 12-in. corbels, 4 ft. long. The stringers extend over two panels and are butted, with staggered joints.

Steel-Beam Spans

As noted above, steel-beam spans were introduced between the ends of the main girder span and the old masonry piers. There are two such spans at each end of the bridge, all of which were constructed of second-hand material. At the easterly end of the main girder the two spans are of 24-in. 100-lb. I-beams, the one adjacent to the main span being 17 ft. long and the other one being 27 ft. in length. At the other end of the main girder the steel spans consist of 15-in. 73-lb. wide-flange beams and are 17 ft. and 20 ft. in length.

Multiple bents are employed under the steel spans, there being a triple bent under each end of the main span, a double bent under the adjacent ends of the two short steel spans at each end of the main girders, and a triple bent on top of each of the old masonry piers, which mark the division points between the steel and stringer construction. The original double bents at the ends of the main span were each supported on three concrete pedestals. In the reconstruction work these pedestals were repaired as necessary and were used as the foundations for the new triple bents.

The height of the bents is a maximum at the ends of the main span and grows progressively less as the ends of the bridge are approached. At the triple bents the height is about 57 ft. from the top of the pedestals to the bridge seat, while that of the adjacent double bents is approximately 68 ft., the variation in the heights of these bents being explained largely by the difference in the depths of the steel spans which they support.

It had been decided to use oak timbers for the sills under the multiple bents, but the members required for this purpose were 44 ft. long and it was not possible to obtain 12-in. by 12-in. oak pieces in this length. This problem was solved by building up members of the desired size from 6-in. by 12-in. oak pieces bolted together. Four-inch ring-type timber connectors were used in these members, which were preframed and bored, and bolted together, before treatment. This procedure was likewise followed in the construction of the corbels, in which timber connectors were also used.

In carrying out this renewal project, the first step was to construct the concrete pedestals, of which there are four at each bent. After these had been completed, careful levels were run over the pedestals and also over the deck of the existing structure, thus permitting the height of the bents to be established.

The work of preframing the bents was performed at this company's framing mill at Green Springs, W. Va., and preservative treatment was applied at its timber-treating plant at the same point, which is now operated by the Koppers Company, Wood Preserving Division. In this work, the members of individual bents, after being cut to size and framed as necessary, were assembled in a horizontal position on a platform and clamped together, after which all necessary bolt holes were bored. At the same time, each member was provided with the necessary identification marks for use in the field. The stringers were likewise preframed and bored. Preservative treatment was then applied, after which the material was ready for shipment to the point of use.

For purposes of identification each bent was given a letter representing its relative position in the bridge. Every member of each bent was stamped in one end with the letter of the bent and a number representing the position of the member in the bent, except the sills which were stamped only with the letter of the bent. The posts and sway braces, for example, were numbered consecutively from north to south. Further to determine the proper positions of individual members, a tie dating nail was driven in the easterly face of each of them. Proper identification of the stringers was made possible by numerals stamped in their ends, giving the span or spans in which they were to be inserted and their relative positions laterally across the bridge. To facilitate the field work, members of given bents were placed together in the same car when being loaded for shipment.

As noted previously, the largest part of the renewal work was carried out in the easterly approach where the first nine of the old bents had previously been replaced with creosoted pile-trestle construction. In the recent work the remainder of this approach was renewed with the frame-bent construction, which work involved the installation of 24 such bents, exclusive of the multiple bents on the old masonry pier and under the steel spans.

In carrying out the renewal work in the easterly approach, the operations were begun with the tenth bent and carried progressively westward. In this work, which was performed under traffic, the individual bents were assembled in the horizontal position by stories, bolted together, and then lifted into position on the pedestals by a locomotive crane. Renewal of the stringers was carried out after all 24 of the approach bents had been installed. The individual bents comprising the triple bent on top the masonry pier and the double bent under the adjacent ends of the two steel-beams spans were assembled and lifted into position separately, after which they were tied together. Coincident with this project, an adjustment was made in the grade line of the bridge deck, involving a maximum raise of 14 in.

Triple Bents a Problem

A special problem was involved in the renewal of the multiple bents comprising the supports for the main girder span. In this phase of the operations it was necessary to erect each of the new triple bents complete to one side of the old double-bent, and then skid it into position after provision had been made to support the end of the girder span following removal of the old double bent.

In accordance with this plan, each of the new triple bents was erected complete on timber falsework in a position under the end of the girder and alongside the old bent; from this position it could be shifted to its final location by a short movement parallel with the track. In preparation for changing out the old bent at each end

(Continued on page 882)

Left—As a General Rule, Five Heaters Were Placed Under Each 15-Ft. Switch Rail, or 10 to the Switch. Insert, Shows Man Setting A New Winter King in Place

Through the purchase of a large number of additional units this year, the B. & M. is now equipped to provide protection against snow and ice at practically every important point on the system. The possibility of a labor shortage, as well as a desire to reduce snow-fighting costs, were the motivating factors considered

B. & M. Gets Ready With 2,818 New Switch Heaters

AN increase of more than 100 per cent in the number of switch heaters in operation is the answer of the Boston & Maine to the problem of fighting snow that is likely to confront it in aggravated form during the coming winter. By this action the B. & M. has taken cognizance of the fact that, as winter closes in this year, the ranks of available extra labor for snow-fighting purposes have been reduced considerably by the increasing demands of defense industries, and that the placing of too much dependence on the use of hand labor for fighting snow would invite trouble. Entirely aside from this consideration, however, the increased investment in switch heaters is expected to bring substantial returns in the form of lower snow-fighting costs.

The large increase this year in the number of switch heaters in use on this road marks the continuation of a trend that had become evident last year. Prior to 1940, the B. & M. had 1,708 switch-heating units in operation, practically all of which were concentrated in the Boston Terminal area. In that year a total of 840 additional units of the pot type, all Winter Kings, were acquired, 180 of which were installed in the Boston area, while the remaining 660 units were distributed among seven outlying points on the system, namely, Dover, N.H.; Kennebunk, Me.; Gardner, Mass.; Greenfield, Mass.; Brattleboro, Vt.; Mechanicsville, N.Y.; and Fitchburg, Mass. Thus, at the beginning of the present year this road had a total of 2,548 switch heaters in operation.

This Year's Program

For installation this year a total of 2,786 additional Winter Kings have been acquired. Of these, 900 have been allotted to the Terminal division (Boston and vicinity), while 1,886 units have been sent to outlying divisions. The addition of these heaters has had the effect of more than doubling the total number of heaters of this type or similar types that were owned by the railroad at the beginning of the year. This road has also purchased 32 units of a type that employs kerosene mixed with compressed air as fuel, which have been inserted in 16 power switches on the Terminal division at Boston.

Requirements Supplied in Full

The switch-heater program for this year was undertaken with the objective of acquiring sufficient units to afford adequate protection at practically all the key switches on the system, such as at interlockings, entrances to yards and important crossovers. To this end the division engineers were asked to submit recommendations as to the requirements of their respective territories, together with estimates of the anticipated sav-

ings. As a result of the recommendations received, 1,212 switch heaters were allotted to the Fitchburg division, 932 to the Terminal division, 554 to the Portland division and 120 to the New Hampshire division. In all cases the requirements of the different divisions for additional switch heaters, as outlined by the division engineers, were supplied in full.

All Key Points Protected

As a result of the program, the railroad feels that all the more important key points on the system are now supplied with switch-heater protection. In fact, as an indication of the wide distribution of the heaters acquired this year, they have been allotted for installation at 30 different locations throughout the railroad. It is expected that, with this additional protection, the regular track forces will not have to be increased to as large an extent as formerly for the duration of snow storms. Without heater protection, it has been necessary in the past at places such as the North Station terminal at Boston to assign one man to a switch to keep traffic moving.

Thus, the increased use of switch heaters on the B. & M. is considered a form of insurance against shortage of manpower that may develop as a result of the national defense program. At the same time, it is expected and hoped that the savings in snow-fighting costs will be substantial.

On the Terminal Division

The manner in which the new switch heaters have been distributed on the Terminal division is indicative of their use on the system as a whole. Of the 900 Winter Kings that were allotted to this division, 530 were acquired for use at the Boston Terminal proper, while the other 370 were distributed to outlying districts of this division. Of those to be installed at Boston proper, 90 are for hand switches in the passenger coach yard (Yard No. 3); 100 are for hand switches at the lower end of a hump yard (Yard No. 9); 140 are for power switches in the same yard; and 200 are for use at hand-operated switches in a freight yard (Yard No. 21).

The switch heaters that are to be installed on the Terminal division outside of Boston proper include 100 units for installation at six power switches at the Wilmington (Mass.) interlocking (New Hampshire division main line). Also 90 units are for installation at the interlocking at Wilmington Jct. (on the main line to Portland, Me., west route), where five power switches are to be protected, four of them in two high-speed crossovers with 30-ft. switch points. Another 90 heaters are to be installed at nine power switches at West Cambridge, Mass., while 70 are for use in seven hand switches in the main line at Reading, Mass. In addition, 10 heaters each are for use in single hand switches at Rockport, Mass., and Peabody.

When installing heaters of the pot type on the B. & M., the practice generally is to place 5 under each 15-ft. switch rail, or 10 at each switch. In No. 20 turnouts, which have 30-ft. points, the practice is to place 10 heaters under the rail, or 20 at each switch. However, these numbers are varied somewhat, depending on local conditions.

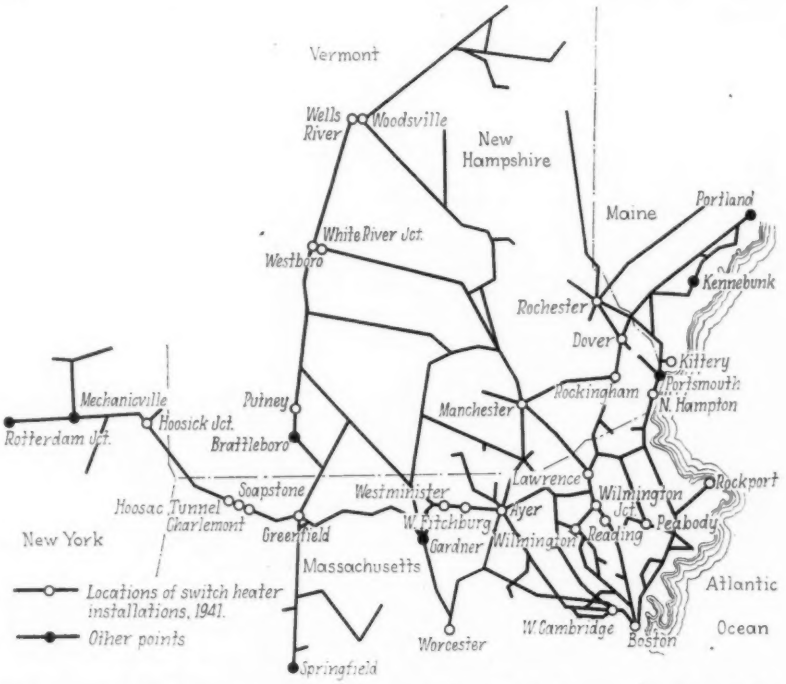
Uses Compressed Air

As part of its preparations for the coming winter, the B. & M. has installed an interesting innovation in snow-fighting equipment at its two hump yards at Boston. The new system is designed to overcome the difficulties that have been encountered in the past in keeping the retarders and the switches at the receiving ends of the yards free of snow. It is now planned to use compressed air for this purpose, the air to be supplied by a 12-tool tie tamper compressor at each yard.

To put this plan into operation, the necessary system of air pipe lines has been laid at the two humps, in which are incorporated angle cocks at strategic points. To clear snow from a given retarder or switch, a hose with a suitable nozzle is attached to the nearest angle cock and the air jet is directed as necessary. As a result of the installation that has been made this year, compressed air will be available for fighting snow at 34 switches and 25 retarders in Yard No. 8, and at 30 switches and 13 retarders in Yard No. 9.

Other Protection

In its preparations for winter, the B. & M. has taken still another step involving the protection of switches. At the time the track layout at North Station, Boston, was revised extensively in 1931, a system of gas-burning switch heaters was installed. Since that time, it was found that there has been a tendency, during severe snow storms, for trouble to be experienced at switches facing to the north, owing to the fact that snow drifts into the spaces between the points and the rails faster than it can be melted. To overcome this difficulty, an additional heating unit has been placed under the rail immediately ahead of each switch point facing in the northerly direction. A total of 52 single switches and 18 slip switches have been so equipped with additional heating units.



Sketch Map of the B. & M., Showing the Locations at Which Heaters Were Installed in the 1941 Program, As Well As in Earlier Years

The Railways Must Have Needed Materials of All Kinds for Current Maintenance and Essential Improvements to Meet the Needs of the National Defense Program

By C. E. SMITH

Vice-President, Purchases and Stores
New York, New Haven & Hartford
New Haven, Conn.

Maintenance men must face the reality of shortages, says chief purchasing officer, as defense and aid to "peoples resisting aggression" take precedence over other needs—but he pleads relief for the railways as vital to our defense efforts and urges co-operation on the part of all railroad forces in the conservation of available supplies

Rearmament Confronts Railroads With Rations of Materials

C. E. Smith

DEFENSE requirements and aid to "peoples resisting aggression" are now being given precedence over other needs. Civilian requirequirements are invited to "take a holiday." This has introduced new conditions into purchasing. Many materials needed critically for defense industries cannot be secured for other use until urgent necessity and their effect on defense production are shown.

The public press is replete with information about the scarcity of materials. No one knows the extent of the government controls that will be necessary, but according to the present determination in Washington, they will be measured only by the greatest possible "All Out" effort in aid of our own defense and that of our friends overseas.

*Abstract of an address presented before the forty-eighth annual convention of the American Railway Bridge and Building Association, in Chicago on October 15.

The Priority System

For the purpose of directing the use of materials that are available so they will be most beneficial to the defense program, the Priority system has been devised. The Office of Production Management has prepared a priorities critical list, which lists the principal items used by the military, as well as by civilians, on which army and navy representatives, in placing their orders or contracts, may issue preference rating certificates. This list includes about 300 items, many of them of direct interest to railroad bridge and building men, such as barges, boilers, bulldozers, air compressors, cranes, power hammers, hoists, lockers, locomotives, machine tools, machinery, business machines, electric motors, nickel alloys, pumping equipment, rubber, scrapers, hand tools, welding rods, and iron and steel products, including rolled, drawn, forged and cast pig iron and alloy steel.

The delivery of such items to the railroads can be made only when they are not needed for the army and navy and for other defense requirements. Some such items have been deflected to defense projects just before they were to have been delivered on long-standing railroad orders. In such cases, the railroads must wait for later delivery. We are not able to produce and import all the raw materials required to meet the needs of "All Out" defense, plus civilian demands—and more shortages may be expected.

Special orders of the OPM of interest to railroad men cover the use of steel in all its forms, machine tools, car and locomotive materials, copper, rubber, zinc, repair materials and others. General Steel Preference Order M-21 put the distribution of steel under mandatory control, and places in the hands of the OPM the control of the amount and kinds of steel that each industry may have. The demands of the army, navy, shipping, Great Britain and others for steel plates, rail and other products are provided for first, and then the railroads and other essential industries fall in line for their share of what is left.

Many people think that it is only

necessary to write to Washington to secure a priority rating. That is not so. These ratings are highly selective, and are issued only after careful study according to certain patterns, which give consideration to the relationship of the project to defense, the availability of the material, the importance of the industry, etc. Merely to secure a priority rating does not insure the delivery of material. That follows only when the company that has the order has the necessary material and does not have in hand orders with higher priority ratings. If it has such orders, then orders with lower ratings must wait, no matter how long they have been in.

Needs Covered Inadequately

How do the railroads fare in all of this activity? Railroading is not usually classed as a defense industry, but it would be difficult to designate one more important to the defense industry. Notwithstanding their importance, their needs for materials are not yet covered completely by priorities. They have not been granted any general preference rating for materials essential to their operations, normal maintenance or improvements.

Preference Rating Order P-8 entitles railroads and carbuilders so designated to use an A-3 rating for materials entering into the construction and repair of freight cars. Preference Rating Order P-21 entitles railroads and locomotive builders to use an A-3 rating for materials entering into the construction and repair of locomotives. Preference Rating Order P-22 entitles railroads and many other industries essential to defense and to civilian requirements to use an A-10 rating for materials for "repairs" to avoid "imminent breakdown," and for "emergency inventory." In addition to these established ratings, it is understood that a new A-10 rating is about to be established and released for materials essential to the routine operation and maintenance of the railways, including tracks and bridges and buildings, but restricted to repairs or replacement in kind.

Must Conserve

Because of the priority situation, deliveries are most uncertain, and no one can foretell when certain types of equipment will be delivered. This situation should suggest to every railroad man, as never before, the necessity for care in the use of materials, and throws a new light on the necessity for reclamation. Both from the standpoint of price, and because of the difficulty and delay in procuring many materials, it will often be prudent, and, indeed, sometimes necessary, to spend more money for repairing a usable tool or part than to wait for a new one. We must be more careful than ever before to reduce our use of new materials to a minimum, to avoid misuse and unnecessary wear and breakage, and to protect it from rust and decay. The necessity for a preference order covering high-speed steel indicates that this material must be conserved. Worn tools should be repaired as long as possible, and when no longer usable, should be assembled at a central point, separate from other scrap, for their strategic value as well as their trade-in or exchange value.

Work equipment is particularly difficult to secure because of the sudden commencement of many government projects on this continent and at our off-shore bases, involving heavy construction. So, maintain all your old work equipment. It may be with you a long time. It may be impossible to get any new work equipment so long as government contractors continue to buy it for government projects.

Defense requirements have directed attention to the importance of scrap in the manufacture of steel. Right now, not enough scrap is being

Released Materials of All Kinds Must Be Given the Greatest Consideration

produced to keep up with steel production. Therefore, it is incumbent upon every one of us to see that every piece of scrap is picked up, and that it moves promptly to the steel mills and foundries. Furthermore, scrap should be gone over more carefully to detect usable material, and reclammation should be resorted to to a greater extent than ever.

Proposes Program of Relief

It is important that we keep in mind the part that each of us is to play. Aside from our duties as citizens, our first task as railroad men is to secure the things necessary to keep our railroads operating efficiently. We must co-operate with those governmental agencies that have the task of allocating materials where they will do the most good, but we must keep our railroads operating efficiently. This is going to require all the ingenuity for which railroad men are noted.

In recognition of the railways' right to treatment as a defense industry, I propose the following program for materials to keep them functioning with full health and efficiency.

It should be recognized that transportation is vital to defense production and that the railroads will handle the bulk of the tonnage, principally heavy commodities, made up largely of iron and steel products. Their maintenance, operation and necessary improvements should be protected as carefully as the requirements of other defense industries. Of what use is defense production unless it can be fed with materials, and its production moved expeditiously, safely and economically?

The attainment of the desired goal will require the utmost cooperation. In the first place, the railroads should conserve materials for national defense by reducing their requirements of critical materials to a minimum, and by not embarking on improvements, except those vitally necessary to maintain their efficiency, and to increase their capacity quickly. For such materials as are needed in this regard, railroads and railroad supply companies should place orders well in advance of use, with correct shipping schedules. Thereafter, they should follow carefully the first three points in the bulletin entitled, "Priorities and Defense," issued by the Division of Priorities, Office of Production Management, Washington, D. C., April, 1941, reading as follows:

(1) Before asking for priority aid, a manufacturer should try other reasonable and customary means to solve his problems.

(2) All producers should give attention to the need for proper scheduling, which is one of the most important factors in the defense program.

(3) Any application for priority aid should be accompanied by full supporting data on the problem.

Tracks and bridges, while vitally important, are next in importance after locomotives and cars. Railroad maintenance forces can get along and keep trains moving, even when materials are delayed, but such periods are limited, and materials must be furnished if a progressive decline is to be avoided. In particular, rail that is being worn out currently should be re-

(Continued on page 875)

Water Service—

Higher Water Delivery Rates, In Many Cases Exceeding 5,000 Gal. Per Min., Are Essential Today If Train Schedules Are To Be Shortened

Is It Keeping Pace?

A. B. Pierce

By A. B. PIERCE

Engineer Water Supply, Southern Washington, D.C.

THE modernization of water service facilities to meet today's operating conditions has been given active and favorable consideration by many railroads during the last few years — resulting in substantial savings with relatively small cash outlays. Economy in railway operation has been the slogan. The many different steps taken by the railroads to reduce their operating costs have brought about marked changes and improvements in water supply facilities.

To compete with passenger automobiles, trucks and buses, speed in passenger and freight service has been essential and demanded. Locomotives have been double-headed, tender tanks increased in capacity, schedules speeded up and water station stops eliminated. At the same time, something had to be done to our old water stations, forgotten while these radical changes were coming about.

Merely to put on another pumper has not been the solution, as we cannot ignore the economy in operation that is desired. Storage tanks have had to be increased to meet the demands due to the reduction in the number of water stations. To help reduce the time required for taking water, larger water columns and supply lines have had to be installed; larger pumps have been required.

In the face of widely changing conditions, water service has kept pace, both functionally and economically, according to Mr. Pierce, addressing the forty-eighth annual convention of the American Railway Bridge and Building Association in Chicago on October 16. However, he warns that much still remains to be done, and that Diesel operation and air conditioning raise new and difficult problems for water service men

Types of Pumping Units

A number of improved types of pumping equipment are being used to replace the old steam pump. Where coal or electricity is not available economically, an oil engine may be used to operate a deep well turbine pump or a horizontal power or centrifugal pump. These oil engine units are fitted with electric starters similar to those used on automobile engines, and may be operated automatically. The starter is energized by a pilot circuit which consists of either a tank float or a pressure switch on the discharge line. Suitable relays and magnetic switches are installed to provide protection against failures of lubrication, fuel oil or cooling water. Low grade oil may be used with these engines.

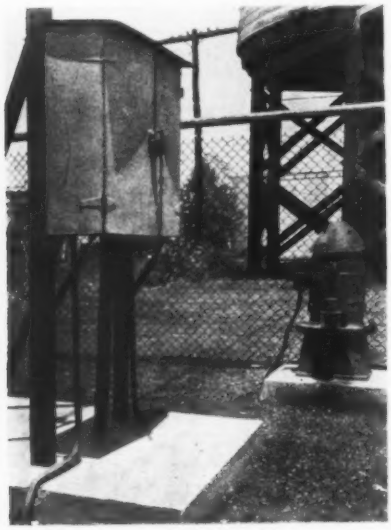
In addition, we now have available close-coupled centrifugal pumps, with the impeller applied to the extended motor shaft. This is a most dependable type of pump and can be installed in any position; it may even be hung on a chain, if desired, in a shallow well. This type of motor-driven pump is adapted particularly to automatic control with either a tank float or pressure switch. A foot valve is required with some form of automatic priming device. If the pump is installed with a suction lift, a ¾-in. bypass pipe from the discharge line to the suction pipe will keep the pump and suction filled with water.

If not too expensive, this type of pump, for most dependable operation, should be installed without a suction lift—in a waterproof pump pit. This requires an automatic sump pump. Such a pump may be installed in the existing pump house with a 12-ft. suction line running to a suction well, and with the water flowing from the source of supply to the well.

An automatic motor-driven power pump may be used which does not re-

quire a foot valve or priming device. This unit is more expensive in first cost and requires more maintenance, but has advantages in handling high suction lifts.

The turbine-type deep well pump is the most dependable and economical pump for automatic service. This type of pump may be installed in an exist-



Turbine-Type Deep Well Pumps, As Now Built, Have High Efficiency

ing suction well, with a small pump house. It does not require a priming device, a foot valve or a waterproof pit with necessary sump pump. Another important consideration is that the pump is always below low water, without a suction lift. Furthermore, the motor is above the pump pit where it is available for ready inspection. An "A" frame tower is generally installed over the pump house for convenient withdrawal of the pump for repair. As now built, these pumps give high efficiency.

Some roads have installed this type of pump with the motor in the well, below the pump and always covered with water. Such a pump is known as a submersible-type turbine deep-well pump. Where extreme rise and fall of water are encountered and it is difficult to install a motor above high water, this type of pump may be used to good advantage. It does not require a pump shaft, which reduces friction loss in the column pipe and eliminates shaft bearing troubles. However, it does require a power cable and an oil line through the well to the motor. A mercury seal is used to prevent water from entering the motor. The motor, pump and power and oil lines all have to be removed for inspection and repair. There is a difference of opinion as to the dependability of this type of pump for automatic operation, without an attendant.

It is not to be expected that any type of automatic pumping equipment, without a pumper, can go without periodic inspection. Such inspection may be placed in the hands of the local track and signal inspectors and the division pump repairmen. All of the electrical equipment can be tested, generally, by the signal department men, and the pumps, piping and tanks can generally be looked after by the track forces. Any repairs found necessary should be reported by telephone, and steps taken immediately by the pump repairman or electrician to put the equipment in proper operating condition.

It is the duty of the pump repairman to test the pumps periodically and to give them general overhauling as necessary, including attention to lubrication and the maintenance of clean suction wells. Pump repairmen should report all necessary electrical repairs to the division electrician. Repair parts should be carried for large or important pumping stations. All automatic terminal pumping stations and pumping stations with chemical treating plants should have full or part-time attendants.

Automatic pumping stations without an attendant should be heated to prevent freezing. Small electric heaters are available for this purpose, which do not involve much expense for current if the pump house is well insulated. In some locations, an electric light, plus the heat from the motor, prevent freezing.

Storage and Columns

With the enlargement of locomotive tender tanks, it has become necessary to install larger water storage tanks. To give dependable service, at least 24-hr. storage should be furnished. Present-day larger tender tanks have made it possible to retire many water stations, which, automatically, made it necessary to enlarge the storage tanks on either side of the stations abandoned.

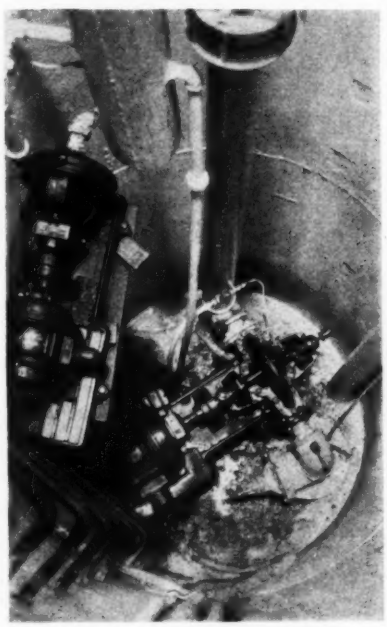
Still, this has not solved the problem of speed in watering locomotives. With larger tender tanks and a reduction in the number of watering points, it has become necessary to deliver water at a greater rate, if train schedules are to be shortened. As a result, it has become necessary to enlarge water columns and water column supply lines, and, in many cases, to elevate storage tanks.

Years ago, a delivery rate of 1,000 gal. per min. for 7,000-gal. tender tanks was ample. Today, a delivery rate of 4,000 to 5,000 gal. per min. is required to keep step with the whole program of speed. As a result, 12-in. telescopic columns are used with 12-in. and 14-in. supply lines in place of 8-in. and 10-in. columns and 8-in. and 10-in. supply lines. These changes, of course, have been necessary largely on main lines, 10-in. columns with 10-in. supply lines still being generally satisfactory on branch lines.

Retirement of Water Facilities

Where electric pumping units are installed, it is advisable to retain the existing steam or oil engine units as stand-bys for emergency operation in case of current failure. These existing units should be kept in good operating condition. To be sure that the old units are available at all times, quarterly reports should be made, indicating the date the old units were actually operated, their condition at the time of test, and all repairs made. The old steam or oil engine units cannot be relied on in an emergency unless they are put in full operation periodically.

The retirement of water stations should be given careful consideration. It is rather dangerous to abandon a source of water supply, tanks, pipe



A Close-Coupled Centrifugal Pump Installed in a Waterproof Pump Pit

lines and pumping equipment until, through actual operation, it is known definitely that this step can be taken. While the Southern has retired more than 60 water stations in the last few years, this has not been done without careful study of operating conditions in each case.

When considering the abandonment of a station, we first determined whether the adjacent stations would furnish the additional water require-

ments through all seasons of the year. If it was found that they would, the plant was taken out of service temporarily, but the facility was not abandoned until it was proved definitely that the station was not required, even for emergency, through actual operation of the new arrangement.

Large Savings

During the last six years we have been given special appropriations for carrying on an extensive program to eliminate old steam plants requiring from one to three pumpers. We now have more than 80 fully-automatic, motor-driven water stations. Sixty of these stations cost a total of $110,000, and have effected actual annual net savings of $78,000, or 70 per cent on the total investment.

At one station alone, where a deep well installation was made, eliminating the purchase of city water at 12 cents per 1,000 gal., the annual saving resulting amounts to $9,800. This saving is not an intangible figure, but is based on former water bills, compared with the actual cost to operate the deep well plant, including inspection, current, maintenance, depreciation, and interest on the total investment in the new facilities of $9,500. This represents a return on the investment of more than 100 per cent. This station has a well 610 ft. deep, a 30-hp. motor, and a 300-gal. per min. turbine pump, with automatic control. At other stations, using close-coupled centrifugal pumps costing from $1,300 to $3,500 each, we have effected annual savings of 40 to 80 per cent.

A survey of the water stations on the Southern showed clearly that all steam pumping stations could not be operated automatically with savings. Some of the plants had to have an attendant to look after the source of supply, which was not dependable; at other locations, current was not available or was too expensive. Also where two or three small steam plants were taken care of by one pumper, we found that it would not pay to install automatic pumping plants.

Water for Diesel Trains

As a water supply engineer, I cannot agree with the statement found in one of the railway magazines recently that if the use of Diesel locomotives continues at the present rate, "the days of the water station will be numbered." In the first place, an exceptionally good quality of water is required for cooling Diesel engines; secondly, air-conditioning requires about three times as many watering points as oil fueling locations.

The water used for air conditioning has to be of a far better quality than for steam locomotives and requires special cleaning pressure pumps and special treatment. Diesel engines carry tanks of only 1200 and 1600 gal. capacity, which have to be filled every 300 or 400 miles. Furthermore, these tanks have to be filled at a high rate of delivery, as most Diesel passenger trains have fast schedules and are only allowed four or five minutes for servicing. On the whole, we have done a good job of modernizing water facilities to meet today's railway operation. With a large reduction in the number of water stations, the enlargement of water columns and storage tanks, the automatic operation of efficient pumps, and improvements in water treatment, we have kept pace with the demands for speed and economy. Water is now being delivered at the rate demanded, of the quality required, and at a lower cost than at any previous period in railway history.

Rearmament and Railroad Materials

(Continued from page 872)

placed currently. Delays in the delivery and laying of new rail accumulate further needs, threaten wrecks due to rail breakage, and delay the release of rails needed for relaying, re-rolling and scrap.

A-8 Rating Proposed for Track and Bridge Requirements

The needs of the government's lend-lease program and the railroads for new rail should be ascertained for each month, months ahead, and the rail mills should be permitted to allocate definitely enough hours to permit the rolling of sufficient rail to meet the current relaying programs of the railroads without cumulative delay. In justification of this allocation of production, it may be stated that rails can be rolled only in rail mills, while shell billets and other materials being rolled in rail mills can be rolled in other mills. Of course, there can be no objection to rolling such other products in rail mills up to the full capacity of the mill not required for rolling rail.

Blanket priorities should be issued in the following order:

Materials for operation, as distinguished from maintenance and improvements A-3
Materials for the maintenance, construction and minimum improvement of locomotives A-3
Materials for the maintenance and construction of freight cars A-3
Materials for the maintenance and minimum improvement of roadway, principally tracks, bridges, signals, etc. A-8
Materials for the maintenance and construction of passenger cars A-8

The use of the above priorities should be extended automatically to the railroads. In cases where, for any

The Rail Mills Should Be Permitted to Supply the Railroads' Needs for Current Relay Programs

reason, railroad transportation is threatened with delay, Priority A-1-A should be issued immediately on request, with the simple formality of stamping a copy of the telegraphic or mail request, the day of receipt:

A-1-A
Donald M. Nelson
Director of Priorities

The long delay pending consideration by priority specialists, processing, issuing, etc., should be avoided.

The importance of the foregoing program is indicated by the scope and volume of purchases of materials by the American railroads. They currently buy more than 50,000 separate items, and thus come into conflict with all defense orders. Their purchases regularly exceed one billion dollars a year, and will probably exceed one and one-half billion dollars in 1941.

Joseph B. Eastman, chairman of the Interstate Commerce Commission, addressing the Association of Interstate Commerce Commission Practitioners on October 9, said that the railroads should not be deprived of the equipment they now have on order, or the materials they need for repairs. Also, that it is of the utmost importance that they secure all the essential equipment and materials they need.

String Lining Which

By THOMAS WALKER,
Roadmaster, Louisville & Nashville
Evansville, Ind.

Many Roads Are Employing String Lining Methods Effectively to Reline Their Curves

In this article Mr. Walker describes computations for string lining curves which permit the actual points of tangent-spiral and of spiral-curve to be located accurately and which also permit the installation of a uniform and balanced curve with identical spirals located so as to best fit the existing curve. The method is a direct answer to those proponents of transit lining who claim that string lining is a "fudging method."

Thomas Walker

FOR some time I have used a method of string lining curves which has been developed with a view of securing more precise results than are usually obtained with the string line method. This method is based on the determination of the true center or point of external of the curve and the balancing of the curve and spiral from this center point. The calculations are simple, and once the true point of tangent-spiral and point of spiral-curve are obtained at each end of the curve, the revised midordinates for the spirals are interpolated to make the spiral fit the proper location. The results compare very favorably with those obtained by the use of a transit and the process is somewhat analogous to the transit method. However, no instrument is used and no mathematical calculations are required beyond ordinary arithmetic.

Locating the Point of External

The first operation is to list the stations and measured midordinates in the usual manner, as shown in column 1 and column 2 of Table I. Then if we average up the body of the curve, being sure to stay clear of the spirals, we find the average middle ordinate to be about 12.8, or 13 using the nearest unit. All of the measured midordinates total 340. Thirteen is contained into 340 twenty-six times, with a remainder of 2. In column 3 we place 13 twenty-six times and divide the remainder 2 equally on either side. It is important that the remainder be an even number.

We can always secure an even number by varying the number of times the midordinate is used or by changing the midordinate. For example, we could use 13 twenty-five times or could use 12 or 14 instead of 13. At this stage, the actual midordinate used in column 3 is not important since columns 3, 4 and 5 are solely for the purpose of establishing the stationing with reference to the point of external (the true center of the curve opposite the point of intersection of the tangents), as is usually done in transit work. In placing the midordinates in this column we fit the existing curve as nearly as we can.

Continuing with the usual string lining computations, in column 4 the algebraic differences between columns 3 and 2 are listed and in column 5 the cumulative differences are obtained. The plus values in column 5 total 182 and the minus values total 2, the difference or net total of column 5 being plus 180. This plus 180 means that we have placed our trial curve too far forward. A net minus value would mean that the trial curve is too far

Table I

Col.1 Stations	Col.2 Measured Midordinates	Col.3 Preliminary Revised Midordinates	Col.4 Differences	Col.5 Cumulative Differences
10	1	0	+1	+1
11	2	0	+2	+3
12	6	1	+5	+8
13	14	13	+1	+9
14	16	13	+3	+12
15	14	13	+1	+13
16	14	13	+1	+14
17	12	13	-1	+13
18	12	13	-1	+12
19	10	13	-3	+9
20	11	13	-2	+7
21	13	13	0	+7
22	16	13	+3	+10
23	13	13	0	+10
24	12	13	-1	+9
25	11	13	-2	+7
26	10	13	-3	+4
27	13	13	0	+4
28	12	13	-1	+3
29	13	13	0	+3
30	15	13	+2	+5
31	14	13	+1	+6
32	10	13	-3	+3
33	11	13	-2	+1
34	12	13	-1	0
35	14	13	+1	+1
36	16	13	+3	+4
37	13	13	0	+4
38	7	13	-6	-2
39	3	1	+2	0
40	0	0	0	0
Total	340	Net	Total	+180

Calculations
Provide Transit Accuracy

back. If we were doing the work with an instrument, at this point we would make a trigonometrical calculation and move the point of curve back the proper distance. With the present method the calculation is even simpler; divide the net total of column 5 by the total of the measured midordinates (column 2). The quotient is the number of stations, or usually the fraction of a station length that the center of the trial curve should be moved to locate the true point of external or center of the curve. Thus 180 divided by 340 is 0.53, the frac-

Table II

		First Complete Calculation after the Point of External Has Been Located Using a Revised Midordinate of 13 on the Curve 3 Station Spiral: Spiral Rate 4.33 Spiral Sums = 26 Length of Body of Curve = 23.16 TS = 10.39 CS = 36.55 SC = 13.39 ST = 39.55				Second Calculation Using a Revised Midordinate of 12.5 on the Body of the Curve 3 Station Spiral: Spiral Rate 4.17 Spiral Sums = 25 Length of Body of Curve=24.20 TS = 9.87 CS = 37.07 SC = 12.87 ST = 40.07				Third Calculation Using a Revised Midordinate of 12.6 on the Body of the Curve 3 Station Spiral: Spiral Rate 4.20 Spiral Sums = 25.2 Length of Body of Curve = 23.98 TS = 9.98 CS = 36.96 SC = 12.98 ST = 39.96				
Col. 1 Stations	Col. 2 Measured Midordinates	Col. 6 Revised Midordinates	Col. 7 Differences	Col. 8 Cumulative Differences	Col. 9 Half Throws	Col. 10 Revised Midordinates	Col. 11 Differences	Col. 12 Cumulative Differences	Col. 13 Half Throws	Col. 14 Revised Midordinates	Col. 15 Differences	Col. 16 Cumulative Differences	Col. 17 Half Throws	Col. 18 End Adjustment
10	1	0	+1	+1	0	0.5	+0.5	+0.5	0	0.1	+0.9	+0.9	0	
11	2	2.6	-0.6	-0.4	+1.0	4.7	-2.7	-2.2	+0.5	4.3	-2.3	-1.4	+0.9	
12	6	7.0	-1.0	-0.6	+1.4	8.9	-2.9	-5.1	-1.7	8.5	-2.5	-3.9	-0.5	
13	14	11.3	+2.7	+2.1	+0.8	12.5	+1.5	-3.6	-6.8	12.6	+1.4	-2.5	-4.4	
14	16	13.0	+3	+5.1	+2.9	12.5	+3.5	-0.1	-10.4	12.6	+3.4	+0.9	-6.9	
15	14	13	+1	+6.1	+8.0	12.5	+1.5	+1.4	-10.5	12.6	+1.4	+2.3	-6.0	
16	14	13	+1	+7.1	+14.1	12.5	+1.5	+2.9	-9.1	12.6	+1.4	+3.7	-3.7	
17	12	13	-1	+6.1	+21.2	12.5	-0.5	+2.4	-6.2	12.6	-0.6	+3.1	0	
18	12	13	-1	+5.1	+27.3	12.5	-0.5	+1.9	-3.8	12.6	-0.6	+2.5	+3.1	
19	10	13	-3	+2.1	+32.4	12.5	-2.5	-0.6	-1.9	12.6	-2.6	-0.1	+5.6	
20	11	13	-2	+0.1	+34.5	12.5	-1.5	-2.1	-2.5	12.6	-1.6	-1.7	+5.5	
21	13	13	0	+0.1	+34.6	12.5	+0.5	-1.6	-4.6	12.6	+0.4	-1.3	+3.8	
22	16	13	+3	+3.1	+34.7	12.5	+3.5	+1.9	-6.2	12.6	+3.4	+2.1	+2.5	
23	13	13	0	+3.1	+37.8	12.5	+0.5	+2.4	-4.3	12.6	+0.4	+2.5	+4.6	
24	12	13	-1	+2.1	+40.9	12.5	-0.5	+1.9	-1.9	12.6	-0.6	+1.9	+7.1	
25	11	13	-2	+0.1	+43	12.5	-1.5	+0.4	0	12.6	-1.6	+0.3	+9.0	
26	10	13	-3	-2.9	+43.1	12.5	-2.5	-2.1	+0.4	12.6	-2.6	-2.3	+9.3	
27	13	13	0	-2.9	+40.2	12.5	+0.5	-1.6	-1.7	12.6	+0.4	-1.9	+7.0	
28	12	13	-1	-3.9	+37.3	12.5	-0.5	-2.1	-3.3	12.6	-0.6	-2.5	+5.1	
29	13	13	0	-3.9	+33.4	12.5	+0.5	-1.6	-5.4	12.6	+0.4	-2.1	+2.6	
30	15	13	+2	-1.9	+29.5	12.5	+2.5	+0.9	-7.0	12.6	+2.4	+0.3	+0.5	
31	14	13	+1	-0.9	+27.6	12.5	+1.5	+2.4	-6.1	12.6	+1.4	+1.7	+0.8	
32	10	13	-3	-3.9	+26.7	12.5	-2.5	-0.1	-3.7	12.6	-2.6	-0.9	+2.5	
33	11	13	-2	-5.9	+22.8	12.5	-1.5	-1.6	-3.8	12.6	-1.6	-2.5	+1.6	+1.7
34	12	13	-1	-6.9	+16.9	12.5	-0.5	-2.1	-5.4	12.6	-0.6	-3.1	-0.9	-0.7
35	14	13	+1	-5.9	+10	12.5	+1.5	-0.6	-7.5	12.6	+1.4	-1.7	-4.0	-3.7
36	16	13	+3	-2.9	+4.1	12.5	+3.5	+2.9	-8.1	12.6	+3.4	+1.7	-5.7	-5.3
37	13	11.0	+2.0	-0.9	+1.2	12.5	+0.5	+3.4	-5.2	12.4	+0.6	+2.3	-4.0	-3.5
38	7	6.7	+0.3	-0.6	+0.3	8.6	-1.6	+1.8	-1.8	8.3	-1.3	+1.0	-1.7	-1.1
39	3	2.4	+0.6	0	-0.3	4.5	-1.5	+0.3	0	4.0	-1.0	0	-0.7	0
40	0	0				0.3	-0.3	0	+0.3	0	0			
Total	340													

tion of a station the center of the trial curve should be moved back. The middle (or point of external) of the trial curve in column 3 is an average between stations 13 and 38, or midway between stations 25 and 26, which if shifted back 0.53 locates the correct point of external at station 24.97. This point is fixed, and once it is determined it can be used for running any desired curve.

Determining the Length of the Curve and Locating the Spirals

We will now try to run in a curve using a midordinate of 13, although the curve actually averages about 12.8. The first step is to determine the spiral to be used. We will use a three station spiral which would seem to fit the existing curve. Three is contained into thirteen 4.33 times, which we call the spiral rate. The revised midordinates for the spiral at each end of the curve would be 4.33, 8.67, 13.00. Note that the sum of the spiral midordinates exclusive of 13, which can be considered on the curve proper, is 13. For this method the spirals must be symmetrical on each end; therefore the sum of both spirals is 26.

The following rule holds good for securing the spiral sum in all cases. Take one less than the number of station *lengths* in the spiral and multiply this figure by the revised midordinate used for the body of the curve. Thus 2 times 13 gives 26. 340 minus 26, the spiral sum, is 314, which is the total number of ordinates left for use on the body of the curve. Thirteen is contained into 314 24.16 times and the length of the regular curve between the spirals is, therefore, 23.16 station *lengths* (not 24.16 as one might hastily conclude). Placing one-half of 23.16 station lengths symmetrically each side of the point of external we get the points of spiral-curve and curve-spiral at stations 13.39 and 36.55, respectively, and the points of tangent-spiral and spiral-tangent at stations 10.39 and 39.55, respectively.

Determining the Revised Midordinates on the Spirals

With the point of tangent-spiral located at station 10.39, the fraction of a station from there to station 11 is 0.61, which multiplied by 4.33, the spiral rate, is 2.64, the revised midordinate required for station 11. Then adding the spiral rate successively to each station as far as the regular curve, gives us the revised midordinates for the remaining stations on the spiral. In a similar manner, the revised midordinates are interpolated for the spiral at the other end of the curve. These midordinates are shown to the nearest tenths. The fractions could be disregarded and taken to the nearest unit, but it is better to figure to one decimal place in order to reduce the amount of adjustment usually required at the end of curve.

The curve is then figured in the usual manner and the half throws secured as shown in column 9 of Table II. Note the very small discrepancy, or adjustment, required at the end of curve. This discrepancy will vary and will be greater for curves with large central angles. It could be reduced to practically nothing by carrying the calculations out to more decimal places but this would be laborious and is not necessary from a practical standpoint.

The half throws given in column 9 are excessive and are caused by using too sharp a curve. If we had used 12.8 instead of 13 for the midordinate of the regular curve, the half throws in column 9 would have been less. If we were running this curve in with a transit, we would make another trigonometrical calculation to see how much to vary the degree of curvature and then run the curve in again. The same can be done in this case by using the following approximate simple arithmetical formula.

$$S = \frac{M^2}{8m^2}$$

In the above S is the change in half throw obtained at the point of external by varying the midordinate of the regular curve one unit. M equals the total midordinates of the curve, and m the midordinate selected for the regular curve. Thus in this case,

$$\frac{M^2}{8m^2} = \frac{340 \times 340}{8 \times 13 \times 13} = 86$$

Thus, if we change from 13 to 12 in this case we would reduce the half throw 86 units at the point of external which would be exactly twice what we want as we should reduce about 43 units at station 25 the nearest station to the point of external. Therefore, if 12.5 is used for the revised midordinate on the body of the curve instead of 13, the half throw at the point of external should be approximately zero. Using this midordinate, the rate of spiral, spiral sums, length of the body of curve and the location of the points of spiral-curve and tangent-spiral for both ends of the curve must be recalculated as formerly and the revised midordinates for the new spirals interpolated. The calculations are carried through columns 10 to 13, and we get the very satisfactory half throws shown in column 13.

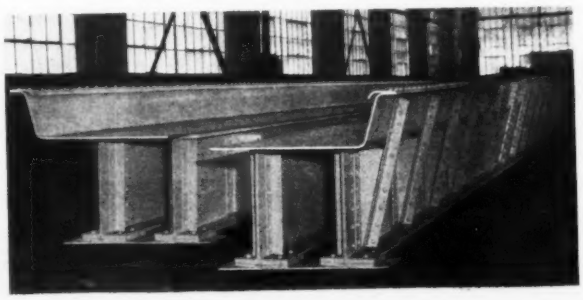
While this gives a good solution of the curve, it will be noted that the half throws, though very small, are practically all minus, which means that the curve lines in at nearly all the stations. It is usually desirable in lining a curve to equalize the amount the curve is to be lined in and out, in order not to disturb the expansion allowance in the rail. Again using the formula:

$$S = \frac{M^2}{8m^2} = \frac{340 \times 340}{8 \times 12.5 \times 12.5} = 92$$

If we sharpen the curve 0.1 unit, making the middle ordinate 12.6 instead of 12.5 we would increase the half throws about one-tenth of 92 or 9.2 at station 25. Using 12.6 we get the results shown in columns 14 to 17. The half throws in column 17 are a trifle better than those shown in column 13.

Note that the final discrepancy in column 17 is only -0.7 unit, which can be distributed as shown in column 18 or can be distributed over any other part of the curve if desired. The solution is now complete. The total amount the curve will be lined is, of course, double the figures in the half throw column and for all practical purposes in staking out the curve the decimals can be ignored, using the nearest unit after the half throws have been doubled.

With a little practice and study one can secure very precise results with this method and can accomplish nearly all that can be done with a transit. In addition, the adjustments at the end of the curve are very small and can be made as small as desired, depending upon the number of decimal points one wishes to use in his calculations.



A Bridge Deck Shop Fabricated in Sections With ½-In. Floor Plates of Mayari R Steel to Provide Added Resistance to Corrosion, and With the Outside Plates Bent Cold Parallel With the Direction of Rolling. Photograph Courtesy of the Bethlehem Steel Company

Foreman Supervision—
The Key to Accident Prevention*

By O. F. Gnadinger
Supervisor of Safety,
Elgin, Joliet & Eastern, Joliet, Ill.

O. F. Gnadinger

GOOD supervision will prevent many accidents. It is the most important factor in any program of accident prevention. The foreman who will look back and consider fairly the accidents that have occurred to men working under his direction, will realize that a little greater activity on his part, and a little more interest in safety, would have prevented most of them.

In our safety endeavors of years gone by we made use of safety committees, inspections for dangerous conditions and practices, safety rule books, bulletin board, posters, safety slogans, etc., but it is now being generally impressed upon us that the prevention of accidents is largely dependent upon the attitude of those persons directly in charge of the work. Perhaps if we had concentrated on supervision from the very beginning, our progress in the reduction of accidents would have been more rapid and more satisfactory in many respects. This statement is based upon experience in casualty matters and is not a theory. In case after case it has been perfectly apparent that faulty supervision, and sometimes the absolute lack of supervision, was responsible for the accident, and that good supervision would have prevented it. Let us illustrate this with an actual case that came to my attention not long ago.

A Foreman Failure

A carload of creosoted piling had been received in a certain storage yard and was set out for unloading. This piling was loaded on a flat car, on either side of which were four sapling stakes, wired across at the top. In addition to this, the load was bound with the patented metal binders that have come into use during the last two or three years, and these so held the load that little of its weight rested against the stakes. It is a matter of record that no such material had been unloaded in this particular yard in nearly 20 years.

The foreman having been notified that the car was on hand for unloading, sent a timekeeper out to his gang of five men, with instructions only as to where to unload the material. A locomotive crane was coupled onto the car and the men made ready to unload it piece by piece.

Two men climbed on top of the load and first cut the three metal binders, causing the load to settle against the stakes. They then proceeded to cut the wiring between two of the stakes, and as they did so, all of the stakes on both sides of the car gave way, and the piling rolled off the car, carrying the men with it. Both received injuries that resulted fatally.

Let me call your attention to this extract taken from the foreman's statement: "Had I been there, I would not have permitted the men to go upon the load until the wooden stakes had been reinforced by metal stakes, preferably old pieces of rail. I assumed that this would be done by the men."

It is my contention that this foreman had no right to assume any such thing. He knew that this was a new operation for his men, and it was his duty, as foreman, to examine the load and see that the men went about unloading it in a safe and proper manner. His failure to do so, his lack of interest in the safety of his men, cost the lives of two of them.

On the other hand, let me call attention to another foreman with an enviable safety record. Shortly after his company made the purchase of safety shoes possible, he made up his mind that every man in his gang of some 40 men should have such shoes and he instituted a campaign to this end, until finally all but three or four were so equipped. His efforts were repaid when, a short time later, a heavy casting fell a distance of about three feet, striking one of the men on the foot with such violence that the metal cap of his safety shoe was split. One toe was fractured, but there was little doubt that without the safety shoe the man would have lost part of his foot. The next day every man in that gang was wearing safety shoes and has continued to wear them since.

One of the oldest of safety slogans is this—"The prevention of accidents is one of your most important duties," and it is just that. It is your duty to the men working under you; it is your duty to the company that employs you; and your duty to yourself.

Frequently we remark that a certain foreman seldom has occasion to make out an accident report. If we take the time to look further into this we learn why this is so. It is because he insists that his men work safely and, not only that, but through his leadership and interest in "safety" he enables them to do so. Being the foreman, he knows the safe and proper method of doing his work, and he insists that it be done that way. He does not permit the use of unsafe or faulty equipment. He knows the capabilities of each of his men. He is familiar with the hazards to be encountered, and how they may be avoided.

In years gone by, working conditions have been improved greatly, so far as safety is concerned. Unsafe conditions have been removed as far as possible, and safer working methods have been devised. Only one other element is required, and that is good supervision.

Men Look to Him

The causes of most accidents are known to us, but from time to time an accident occurs as the result of some unforeseen or unconsidered cause. The only means of combatting such occurrences seems to be for the foreman to be "on the job." He should know at all times just what his men are doing, and if an unusual situation should arise, he should be on hand to point out to them the correct and safe way of going about the work.

The average workman today "believes in safety." Insofar as the safety of himself and his fellow-workers is concerned, he goes about his work in a manner that would have provoked ridicule from the average workman of 30 years ago. He does not hesitate to call attention to unsafe conditions and methods, and he insists upon being provided with safe equipment.

However, when any unusual condition arises, or when any new or unfamiliar work is assigned to him, he is justified in looking to his foreman for help and guidance. Under such conditions his foreman should be in position to furnish such assistance, and to see that the work is done in the safest manner possible.

I have had occasion to examine and look into the causes of many accidents. I do not say that good supervision would have prevented all of them, but I do insist that it would have prevented a great many of them. And so to the foreman I say—"Be on the job. Know what your men are doing at all times, and be sure that they are going about their work safely."

Improved Performance from Wire Rope

AMONG the factors contributing to the improved performance of wire rope are the selection of a proper rope for the service and equipment; correct installation; proper maintenance, lubrication and inspection; and correct operation and handling. By considering all these factors, the Chicago, Rock Island & Pacific has endeavored to make its investment in rope go farther than formerly. To this end, it has educated its maintenance and shop men in the handling of rope-operated equipment, and in the proper maintenance, lubrication and inspection of the wire ropes on the equipment assigned to them.

Type of Rope Important

This road generally follows the practice, in selecting wire rope, of using the type and construction supplied or recommended by the manufacturer when the equipment was new. On the other hand, when it is believed that rope service can be improved by using another kind of rope, as occasionally happens, the change is made. In several cases the service life of wire rope has been doubled by making such changes.

If possible, rope constructions are used that are especially suited for given situations. As an example, where fatigue is a serious problem, caused by operating the rope over small sheaves and drums, advantage is taken of the high fatigue resistance of preformed rope. For drag cables on dragline machines, and in other places where the rope is subjected to severe abrasion, ropes of Lan Lay construction are employed, since these offer greater resistance to abrasion than regular lay ropes. Ropes with independent wire rope centers are used in installations where the rope winds onto the drum in more than one layer and is heavily loaded, this center preventing the flattening of the rope by the pressure of the top layer. Preformed rope is used in wire rope slings because this type contains no torsional stresses and lies straight and limp, much as a manila rope. In addition, it is easily handled and hooked onto and off the load, thus saving the time and patience of the workmen.

All wrecker cranes are provided with spare ropes cut to the proper length so that if a broken rope makes it necessary to apply a spare, the equipment is out of service only long enough to make the replacement. For some overhead cranes, as well as other types of equipment, the road finds that it is not necessary to keep spare rope on hand, but makes a requisition for new rope when the regular inspection shows the old rope to be near the end of its service life.

Service Records

The Rock Island has kept records for a number of years of the service life of the many ropes it uses. The record form has space for three ropes and includes a description of the equipment and type of service, a description of the rope, the condition of the sheaves, a record of the work accomplished, the dates the rope was applied and removed and the dates it was lubricated. This form, properly made out for the old rope that is to be replaced, is attached to the requisition for a replacement. When the new rope is shipped, the service record is returned with it. As soon as one of these records is completely filled out with the service records of three ropes used successively on the same piece of equipment, it is filed permanently.

By means of these records, a fair or average service life is determined for the rope on any given machine under average conditions of service. Comparisons of different ropes are also possible, provided the deviation from the average life is due to the rope and not to other factors. These records also serve to point out conditions that have an adverse effect on rope life and which therefore need correcting.

Safety

In railroad work, it is especially important that rope loads do not exceed safe limits. Because of the importance of this subject, workmen and engineers are informed of the factors affecting safe rope loads and are instructed to be guided by the manufacturer's capacity markings on the machine or the rope manufacturer's rated safe loads for the rope. After the rope has been in service, the operator is also governed by the rope manufacturer's recommendations and prescribed rules regarding the care, maintenance and inspection of the rope. As an additional factor of safety, the Rock Island makes it a practice to renew all boom cables subject to corrosion or exposure to gases every two years, regardless of wear, if inspection does not indicate the need for renewal sooner.

Based on its experience in rope inspection, together with recommendations of rope manufacturers on the subject, certain rules of inspection have been set up, among which are the following:

(1) The operator of each piece of equipment shall look over the equipment at the beginning of his turn of work. In making this inspection, attention shall be given to the cable, fastenings, sheaves, the winding of the cable upon the drum and the condition of lubrication.

(2) The regular repairmen assigned to the maintenance of the equipment shall make an inspection once each week and shall also observe the condition of the equipment each time work is done on it.

(3) A detailed, careful inspection shall be made monthly by an experienced man assigned to this work. In carrying out the inspection, the equipment shall be operated and all of the cable unwound from the drum and lowered to the floor. Ordinarily, the lubricant is not removed, but the cable is drawn through the hands to detect any wear and broken wires. If the lubricant is too stiff or thick to permit proper inspection, a scraper will be used in different places to determine if wear or breakage is taking place.

All ropes are lubricated when applied and every two weeks thereafter, except those in which the type of service prevents lubrication except when installed. The proper form of lubrication is important and considerable benefit has been derived from the use of a lighter weight of crater compound than was formerly used.

The Rock Island furnishes its inspectors with standard forms for each of the following classes of equipment: Work equipment, post cranes, coal elevators, cinder and wheel hoists, passenger and freight elevators, electric traveling cranes, and locomotive-type cranes. The system of inspection and reports, which has been referred to, has now been in use on the Rock Island more than ten years. It has instilled in the minds of the personnel the fact that wire rope deserves the same consideration as regards care, maintenance and inspection as a motor or any other piece of equipment. All this has led to better rope performance, fewer reropings, fewer shutdowns of equipment, and more service per dollar of rope investment.

Highway Crossings of Laminated Wood

SEVERAL interesting installations of Laminex sectional crossings have been made at intersections of main line tracks with heavily-traveled highway and street crossings by the Wheeler Lumber, Bridge and Supply Company, Des Moines, Iowa. The Laminex sectional crossing, as the name implies, is installed in sections which are composed of built-up laminated yellow pine or Douglas Fir strips, 2 in. wide and 3, 4 or 5 in. high, depending upon the rail height and crossing requirements. The strips are pressure-treated with 10 lb. of No. 1 creosote oil per cu. ft., before being assembled with 16-d galvanized nails into sections which are approximately 16¼ in. in width and 8 to 12 ft. long. The end sections are framed to fit individual crossings and are beveled and protected with metal end plates, fastened with heavy wood screws.

The sections are installed with three rows of sections between the rails and two outside and rest directly on the ties or on wood shims placed on every tie to bring the tops of the sections level with the top of the rail. A special design of anchor plates firmly anchors the sections to the ties and also to the rail, so that the entire crossing deflects as a unit under traffic. The anchor plates, which are provided left between the ends of the anchor plates on the center sections to prevent the shorting of signal circuits. Flangeways are provided by rails laid sidewise, with the base against the side of the center crossing sections and the ball against the web of the running rail.

The first Laminated crossing was installed in May, 1939, at the intersection of the west bound main track of the Chicago, Rock Island & Pacific with East 18th street in Des Moines, Iowa. This crossing is 36 ft. long and was installed in accordance with an original design, which has since been improved to provide heavier anchor plates, longer sections and longer and larger lag screws. In addition, the anchor plates on the outside sections of this crossing are not hooked under the ball of the running rails, as in the present design. The traffic at this crossing is unusually heavy, since it is the only street crossing in that vicinity and is the principal outlet of a large portion of southeast Des Moines, connecting that area with the remainder of that city. Much of the traffic over this crossing consists of heavy trucks, since a meat packing company, several bulk oil stations and two large grain elevators are served by this street. An indication of the density of the traffic over this crossing was secured on September 10, 1941 by a traffic count taken which showed that 1,849 motor vehicles passed over the crossing between 7 a.m. and 5 p.m., an average of 185 vehicles per hour. The maximum count for any one hour during this period was 222.

A Laminex Crossing on the Rock Island at Easton Blvd., Des Moines, Iowa, Installed in June, 1940

This Crossing at East 18th Street, Des Moines, Iowa, Was Installed in May, 1939, and Is in Good Condition, Although the Pavement at the Edge of the Crossing Has Begun to Fail

at the ends of the sections, are ⅜-in. wrought iron strips 4 in. wide. They are set in the laminated sections flush with the surface. Long lag screws ¾ in. by 10 in. or 11 in., extend through the anchor plates and crossing sections into the ties. The inside anchor plates are formed to extend downward at the flangeway edge of the sections and under the base of the running rails of the track, while the anchor plates on the outside sections are formed to hook under the ball of the track rails. A 2-in. gap is

Very Little Wear

In spite of the fact that this crossing was not installed in accordance with the later improved design, no maintenance has been required since its installation, the laminex sections show very little wear and the laminate strips are tight and solid. Indicative of the resistance of the crossing to heavy trucking and wear, the brick pavement on both sides of the crossing is failing and small depressions have developed in the pavement along the outside edge of the outside sections, allowing the truck wheels to strike the upper exposed corner of these sections a severe blow. Yet, even this condition has resulted in little wear on the exposed edges of the outside laminex sections.

Crossing Installed on the K.C.S.

In November, 1939, another Laminex crossing 32 ft. long was installed in eight-foot sections on an industry spur of the Kansas City Southern at Argentine boulevard in Kansas City, Kan. Although only occasional switching movements pass over this track, the highway traffic is very heavy, since it is located in an industrial area, and Argentine boulevard is one of the principal traffic arteries between Kansas City, Kan., and Kansas City, Mo. This crossing was installed in accordance with the improved design, and in spite of the heavy traffic to which it is subjected, it is reported that it has required no maintenance expenditure since its installation and is still in excellent physical condition.

In June, 1940, three Laminex crossings were installed on Easton boulevard, Des Moines, one in the main line of the Chicago Great Western, another in the main line of the Rock Island to Minneapolis, Minn., and the third on the Ft. Dodge, Des Moines & Southern. While these crossings have not been in sufficiently long to give any idea of their ultimate service life at this location, they are still apparently as good as new, although Easton boulevard is one of the most

important traffic arteries in the city, being a diagonal highway leading out of Des Moines on the principal highway route to Chicago. In addition, this street is served by electric trolley busses and a large amount of local traffic passes over the crossings, since they are located well within the city proper and are reasonably close to the business and manufacturing districts.

Other Laminex crossings have been installed recently at several heavily traveled highways or streets, including a crossing of highway No. 75, with the main line of the Chicago & North Western at Missouri Valley, Iowa, installed in September, 1941; and three crossings installed in October, 1941, on East Grand avenue, Des Moines, one in the main line of the Rock Island and two on the Chicago Great Western.

Advantages of Laminex Design

A number of factors are said to contribute to the ability of Laminex crossings to stand up under the heaviest highway traffic. In the first place, the heavy treatment of the laminate strips before their assembly into crossing sections, insures complete penetration of the preservative and that they will resist decay indefinitely. Secondly, in their assembly, the laminate strips are placed on edge, instead of flat, like ordinary crossing plank, so that the vehicle wear is on the edge grain of the wood, instead of the flat grain. This provides greater load-carrying strength, and the traffic also tends to compact the grain instead of loosening it. Furthermore, anchoring the crossing sections securely to the rail and ties of the track, provides a crossing that is not broken up or loosened by the vibration of railroad traffic, since it deflects as a unit with the track.

A number of other advantages are also claimed for Laminex crossings. The sectional design permits quick removal and replacement of a portion of the crossing for track work whenever required, without the necessity of closing the entire crossing or a large portion of the crossing to traffic. In addition, the Laminex strips maintain a tight bond under traffic, which, if anything, becomes tighter in service, so that the crossings actually shed water, keeping the ballast underneath dry and preventing water and dirt from fouling the ballast beneath. As a consequence, the track through the crossing can be maintained more economically, since it will maintain its surface longer, and troubles with heaving track in winter, which frequently occur at highway grade crossings, are greatly lessened.

B. & O. Pre-Frames Large Approach Trestle

(Continued from page 868)

of the main span, the girders were jacked up slightly to clear the old bent and then blocked up on the new bent in its temporary position. This relieved the load from the old bent so that it could be removed.

At the same time a "strong back" was constructed to support each end of the main span while the new bent was being shifted into its final position. Each "strong back" consisted of four 24-in. I-beams, so placed longitudinally on the deck of the main span that their ends overlapped on to the adjacent approach span where they rested on blocking. The girders were fastened to the I-beams by means of U-bolts. When this had been done, and after the old bents had been removed, the load was transferred to the "strong back" from the new bent which was then skidded into place, using three hand-operated winches. The work of installing the new triple bents was performed on successive Sundays, when no trains are operated over this line.

Quantities and Treatment

In the work described in this article, the amount of creosoted timber that was used included approximately 159,000 f.b.m. of fir, oak and pine in the frame bents; about 20,100 f.b.m. of fir for the girts and other longitudinal bracing; 27,500 f.b.m. of fir for the stringers; and about 29,800 f.b.m. of oak bridge ties and pine guard rails. The figures for the stringers and deck material include the quantities that were inserted in the pile-trestle spans at the ends of the bridge. All this material was treated with straight creosote, the retention of preservative being 10 to 12 lb. per cu. ft. for the bent timbers, longitudinal bracing and stringers, and an average of 10 lb. for the ties and guard rails. Also, the reconstruction of the easterly nine bents involved the use of 1,600 lin. ft. of creosoted oak and pine piling, having a retention of 12 lb. of preservative per cu. ft.

The reconstructed portion of this bridge is considered to be adequate for any traffic that it may be called upon to carry, and it is felt that, because of its careful preframing and the thorough treatment employed, it will last indefinitely with little or no maintenance expense.

The work described in this article was carried out under the general supervision of P. Petri, engineer maintenance of the B. & O., and C. B. Harveson, engineer maintenance of way of the Eastern lines. Direct supervision over the work in the field was exercised by J. L. Maher, at that time division engineer of the Baltimore division, but since transferred to the New York Terminal lines, and H. W. Routenberg, assistant division engineer of the Baltimore division. The preframing and treating operations were conducted under the direct supervision of John T. Andrews, assistant engineer. All field work was performed by company forces under Raymond Booth, foreman.

New Book

Proceedings Wood Preservers' Association

PROCEEDINGS of the American Wood-Preservers' Association for 1941. 493 pages, 6 in. by 9 in. Illustrated. Bound in cloth. Published by the Association, 1427 Eye street, N. W., Washington, D.C. Price $6.

This volume contains thirty-six papers and committee reports, together with the discussions that followed, which were presented at the thirty-seventh annual convention at Louisville, Ky., in February.

Among the papers of special interest to maintenance men are those on Information Obtained from Marine Piling Experiments on the Gulf Coast, by J. D. MacLean, senior engineer, Forest Products Laboratory; Thirty-one Years Experience with Treated Ties on the Lehigh Valley, by A. N. Williams, president of that road; Use of Treated Timber and Ties by the Louisville & Nashville, by L. L. Adams, engineer maintenance of way; and Revising Burlington Bridge Standards to Reduce Preframing of Creosoted Timber, by G. A. Haggander, assistant chief engineer, Chicago, Burlington & Quincy. Other papers containing valuable information include those on the Preservation of Wood with the Boliden Preservative Composed of Difficultly Soluble Arsenates; on Kiln Drying Longleaf Southern Pine Poles; Studies of the Biological Environment in Treated Wood in Relation to Service Life; Comparison of Preservatives in the Mississippi Fence Post Study; and An International Termite Exposure Test.

There is also included a report on the Quantity of Wood Treated and Preservatives Used in the United States in 1940, compiled by R. K. Helphenstine Jr., Bureau of Forestry, United States Department of Agriculture, this being the thirty-second consecutive report on this subject.

WHAT'S the Answer?

Advantages of Gage Rods

Under what circumstances are gage rods or gage plates necessary or preferable to double spiking on curves on main tracks? On switching tracks? How should they be installed?

Increase Tie Life

By A. E. PERLMAN
Chief Engineer, Denver & Rio Grande Western, Denver, Colo.

We have found that the application of gage rods does not eliminate the necessity for double spiking on curves of 10 deg. and sharper, but they will reduce this need to some extent on lighter curves. Gage rods reduce materially the spike-killing of ties caused by repeating gaging of the track. The saving in labor alone on this item will run as high as 50 per cent. Obviously the mechanical destruction of the ties will be reduced and the life of the ties will be greatly increased—in some cases doubled.

Another advantage to be gained from the use of gage rods is a considerable reduction in spike cutting and spike lifting. However, gage rods do not eliminate the possibility of rail turning over on sharp curves; hence the need for frequent inspection of the gage on curves will not be lessened by the use of gage rods. Four gage rods to the rail length have given satisfactory results. More may be required, however, on extremely sharp turnouts or curves.

Rails Act as a Unit

By J. B. AKERS
Assistant Chief Engineer, Southern, Washington, D. C.

To maintain gage, it is necessary that the lateral thrust on the rail be opposed effectively. In the days before tie plates, double spiking was the principal means for doing this. However, the effectiveness of the spikes was limited by the lateral crushing strength of the wood of the tie. Even with the tie plates we now have, there is still difficulty in holding the rail in its place, notwithstanding the driving of several spikes to help hold the tie plate. The lateral crushing strength of the wood in the tie will always be the limiting factor in holding the rail in place where spiking alone is depended on to provide the required resistance to these lateral thrusts. This may be sufficient under moderate loading and speeds, but as these increase something additional is required, such as gage rods and gage plates.

The first requisite is to have the track in good line, after which it would remain in position except for the effect of traffic, settlement of roadbed and ballast or instability resulting from other causes. Even with perfect track and with cars and locomotives in perfect mechanical condition, we still have the lateral thrusts against the rail resulting from changes in direction of locomotives and cars.

Gage rods or gage plates are always preferable to double spiking, because where they are used we can have both rails acting as a unit. These fixtures come into play when the load is on the rail. There is benefit in this because the rail that would move out

Send your answers to any of the questions to the What's the Answer Editor. He will welcome also any questions you wish to have discussed.

To Be Answered in February

1. Is there any merit in the distribution of weekly or monthly statements of work done by the foremen of a district as a means of stimulating them to strive for records? Any disadvantages? Why?

2. What methods are desirable in finishing new yellow pine for interior surfaces? What preparatory work is necessary? Why?

3. The A.R.E.A. specifications for both stone and blast-furnace slag ballast allow four groupings, namely, 1 in. to 2 in., ½ in. to 1 in., ¾ in. to 1½ in. and ¾ in. to 2½ in. In view of the refinements in line and surface demanded by high-speed trains, toward which limit should the preponderance of the sizes run? Why? Does this differ between stone and slag? Does the kind of stone make any difference?

4. How can the load be transferred from a concrete cap or bridge seat to steel H-beams or other types of steel bearing piles on a pile pier? What provision can be made to prevent failure of the concrete above the ends of the steel piles?

5. What rules should govern the lubrication of motor cars?

6. Is it good practice to pack hydrant pits with sawdust or other material to prevent freezing? If so, how should this be done? If not, why? What other methods can be employed?

7. Is it preferable to bend the inside joint bars at the heel of the switch or to plane them off, to provide for free movement of the points when thrown? Why? What alternative plan, if any, can be employed?

8. Should the roofs of enginehouses be insulated? Why?

is restrained by a steel tension member which is attached to the opposite rail, which is held down firmly by the load; spikes alone cannot do this.

On curves on main tracks where difficulty is met in holding the rail in its place, gage rods or gage plates are far preferable to double spiking, because less dependence is placed in the lateral crushing strength of the wood of the tie. Gage rods should be placed so that there is one on each side of each joint and one in each quarter, giving six rods per rail length; in some places, even more will be required. Gage rods or gage plates should be placed immediately ahead of each main-line switch point to maintain gage effectively at the point and to oppose the thrust resulting from trains leaving sidings to go on to main tracks.

On switching tracks which are used very much, it is desirable to place gage rods or gage plates just ahead of all switch points, and to place about ten gage rods between the switch point and the heel of the frog. It should not be necessary to apply gage rods on the tangent part of these tracks.

Programming Building Repairs

Can building repair work be programmed? If not, why? If so, to what extent? How is the program prepared?

Can Be Done

By A. G. Dorland
Assistant Engineer, Elgin, Joliet & Eastern, Joliet, Ill.

Building work can be programmed, although every year additional maintenance develops that was not foreseen when the program was prepared and it becomes necessary to defer some of the scheduled work until the following year. A building supervisor usually is receiving complaints and suggestions from station agents, yardmasters, shop foreman and others in the operating and mechanical departments, about the buildings they occupy. A list of all of these repairs and other suggestions should bemade as they are given and checked carefully at the time of the fall inspection.

In connection with this inspection, we use a set of forms, each set consisting of a blue, a white and a yellow sheet. The inspection procedure and the preparation of the program is as follows:

1. The building inspector, the general bridge and building foreman and others who may be interested go over the line and make a detailed inspection of all structures, listing the repairs that should be made the following year. This inspection is usually made during September or October, and the materials and labor that will be required, together with the reasons for recommending the work, are entered on one copy of the form.

2. The information gathered in the field is then brought into the office, checked, priced and summarized.

3. Before the formal budget is prepared, these details and prices are checked by the superintendent of bridges and buildings and the assistant chief engineer and are separated into "must" and "can" items. Such work as is approved then becomes a part of the maintenance program for the following year.

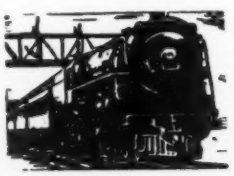
4. After the field sheet is priced and checked, it is typed in triplicate on the forms. One copy is retained by the chief engineer, another copy goes to the superintendent of bridges and buildings and the third copy is submitted to the foreman who will do the work.

5. Separate inspections should be made for (a) work ordinarily performed by carpenter gangs; (b) electrical work; and (c) heating and plumbing.

6. When the inspection sheet is handed to the foreman, he is instructed to follow the authorized repairs as nearly as practicable. It is recognized, however, that when a building is undergoing repairs, conditions may be uncovered that will not be disclosed during the inspection, no matter how carefully it may be made. If the conditions warrant, these additional repairs are made at the same time as the authorized repairs.

7. In general, the allocation of the work is geographical, according to the gangs available for the field assignments.

8. In years of reduced earnings, budgets may be curtailed substantially. When this occurs, the repairs which are considered as absolutely necessary can be selected from the inspection reports and given preference.



Difficult to Carry Out

By O. G. Wilbur
Field Engineer, Baltimore & Ohio, Baltimore, Md.

Building repair work can be programmed, but the difficulty arises after the program is arranged, in the effort to carry it out. An annual inspection of buildings will be of material assistance in formulating a schedule of needed repairs and the estimated appropriation required to meet the schedule. The first shock to the proposed program is usually experienced when the amount actually authorized is compared with what is needed, and it becomes necessary to eliminate numerous items to give precedence to the more important ones.

Another shock to the program occurs when things happen that cannot be foreseen, such as floods, fires, wrecks, etc., that require concentration of forces quickly to repair damage and restore operation. Fluctuations in tonnage movement is another obstruction that is encountered in maintaining a repair program. Forecast revenues may not materialize, with the consequence that budget cuts necessitate the postponement of programmed work. A program prepared on the basis of making repairs according to their relative importance is probably the nearest practicable solution to this problem.

To Marked Advantage

By L. G. Byrd
Supervisor Bridges and Buildings, Missouri Pacific, Poplar Bluff, Mo.

There is a marked advantage in programming building work, particularly with respect to structures at outlying points where the repairs are usually light, and should be completed out of face by gangs that work progressively over the line. At large terminals it is our practice to repair the buildings out of face, so far as possible, usually with gangs assigned to these terminals. After the preliminary inspection is completed, the structures requiring heavy repairs, including painting, are listed in the order of preference and in making the repairs this list is followed so far as our appropriations will permit.

Many inspections are made and carried beyond the limits of good judgment with respect to work that is de-

sired for the sake of appearance rather than utility. The building inspector and the supervisor should be well informed as to how much can or should be carried out with the forces available and an average appropriation set up month by month to perform such work as is the most important.

Caring for Motor Cars

What details should receive attention in the care of a motor car to insure the best service from it?

Lubrication Heads List

By C. L. Fero
Supervisor of Work Equipment, Boston & Maine, Boston, Mass.

Lubrication is the most important item in the care of a motor car if the best service is to be obtained from it. This applies not only to the internal lubrication of the gasoline engine but to all moving parts of the unit, such as axle bearings, drive chains, differential axles, loose wheels, etc. Of no less importance is the use of the correct grade of lubricant. The correct mixture of motor oil with gasoline to insure the minimum formation of carbon and yet obtain proper lubrication of two-cylinder engines is also essential for good operation, In this connection, it is desirable to select one mechanically-minded member of the crew with some knowledge of gasoline engines, to act as operator of the car.

Inspection at regular and frequent intervals to discover and correct defects that may lead to failure, is an important item in the care of any car to insure good service. The condition of the following parts should be observed carefully: wheels and tires; loose wheel and bushings—for wear; chassis bolts and nuts; rail sweeps; brake shoes and liners—avoid wearing into the wooden shoes to insure satisfactory braking power; unusual wear from improper adjustment of moving parts, such as axle bearings, loose wheels or differential axle.

Particular attention should be given to the handling of the car. Many good cars have been damaged seriously by rough handling when setting off or on the rail. The front end should be set off the rail before attempting to turn or set off the car. If this is not done, it will not be long before an axle will be sprung or the frame will be thrown out of line. It will also have a tendency to drive the loose-wheel bushing too far on the axle taper and possibly to spring a wheel.

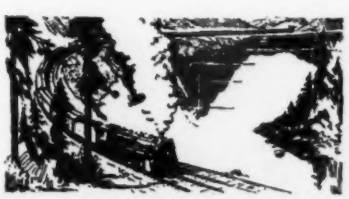
Overloading is another, and too common, method of shortening the useful life of a track motor car. The hauling of heavily-loaded trailers unnecessarily, should be avoided. The use of inspection-type cars for section service, or the use of section cars in extra-gang service is detrimental. An operator should never race the engine and then snap tension on the belt, as this places a terriffic strain on all parts of the engine. However, the racing of engines and very high speeds on the track have been greatly reduced on many roads since the advent of battery ignition. Some railway officers have expressed the view that governors should be installed on certain cars to control the speed for the few who will not observe the rule on speeds.

General overhauling of cars in the shop on a schedule basis is a necessity to insure long life. A standard set of tools should be provided to permit field repairs by the operator, and this kit should be kept in good condition at all times. Periodic inspection by the district motor-car maintainers is of the utmost importance and the foreman or operator should feel free to call upon him for assistance at any time that he thinks this is desirable. Finally, all gangs should be educated to realize that the motor car is a most important unit and to keep it in excellent condition at all times.

Maintain Good Compression

By C. H. Ordas
Supervisor of Motor Cars, Chicago, Milwaukee, St. Paul & Pacific, Chicago

Modern motor cars are well designed and will give many years of dependable service if they are cared for and operated properly. Every foreman should be educated to the fact that his motor car is one of the most important units of equipment in his outfit and that it should be kept in the best of condition and ready for immediate service at all times. When receiving a new or a reconditioned car, one should secure a copy of the manufacturer's instruction and parts book, which should be read carefully and complied with before operating the car.



When starting a new or a reconditioned engine, the regular gas and oil mixture should be enriched by adding about one-half pint of regular lubricating oil to each gallon of fuel, with which it should be well mixed before it is poured into the gasoline tank of the car. This mixture, rich in oil, should be used until the engine is well broken in, about 500 miles of operation being sufficient, after which the standard mixture should be used. During this period, the car should not be operated at maximum speed or be allowed to pull maximum loads. At no time should the engine be raced, for such abuse will ruin it quickly. Another way of preventing damage is to comply with safety rules.

A dirty car is a fire hazard; it should be kept clean, well painted, with good lubrication for all parts, and correct adjustment for all wearing parts. Good compression should be maintained, as well as correct carburation and ignition. Frequent injection of kerosene will work wonders in keeping the carbon binder soft, and the rings, exhaust ports and combustion chamber free of carbon. This should be done either through the air intake of the carburetor, the priming cap or the spark-plug hole, while the engine is still hot before putting the car away for the night. The piston should then be put up against compression and held there by a light belt tension. An engine laid up for any length of time should have the piston at the top of the cylinder, to cover the cylinder ports and keep out moisture, which may rust or cause a coat of frost on the cylinder walls, which will increase the difficulty of starting.

Select spark plugs with the same heat range as those that came with the engine. The porcelain shells of the plugs should be kept clean, both inside and outside, and the points should have the correct gap, usually 0.025 in. All wiring should be kept free of oil and the connections should always be tight. Wires, particularly the one running to the spark, should be kept away from metal parts of the frame and engine to avoid current losses. The timer-contact wipe should be as short as possible, allowing the coil to buzz only while the flywheel rim moves about 4½ to 5 in.; more wipe is wasteful of current. One should use maximum spark advance only for high car speeds, reducing the advance as the speed is reduced with the throttle. It is also desirable to refrain from brake

applications while the engine is pulling the car; the throttle should be closed before the brake is applied.

A lean gas mixture is slow burning; that also deprives the engine of some of its lubricating oil, and it will heat the engine. Too rich a mixture will result in a four-cycling sluggish engine and deposits of carbon in the combustion chamber, thus fouling spark plugs, closing exhaust ports and causing poor ejection of exhaust gases. All fuel, oil and greases should be kept in clean well-stoppered containers; dirty oils and greases become grinding compounds that are unfit for lubrication. Again, a good gasoline may become a poor starter if the lighter fractions are allowed to exaporate. Water-cooled engines should use the purest of water to prevent liming or caking of the hoppers, necessitating the frequent removal of scale to prevent overheating the engine.

Inspection Before Painting

Should wood surfaces be inspected prior to painting? Why? In how much detail? Who should make the inspection?

In Much Detail

By L. G. Byrd
Supervisor of Bridges and Buildings, Missouri Pacific, Poplar Bluff, Mo.

Both interior and exterior surfaces should be subject to a close and thorough inspection before the preparatory work in advance of painting is started. Such an inspection will disclose some of the details that must be given particular attention before the painting is started. First, it should include the location of decayed material, loose molding and other boards, all of which should be replaced or repaired in advance of the painting. Greasy spots and boards rich in resin should be removed or covered with a prepared filler to prevent the discoloration of the paint.

Paint is applied to structures for two primary purposes, to protect the surfaces and to improve their appearance. Neither of these purposes will be accomplished unless decayed material is replaced with good material, all loose parts tightened and all surfaces cleaned thoroughly so that there will be no discoloration or peeling of the paint.

It has been my experience that building paint blisters and peels quite often on window sills, door casings and siding. This is generally the result of carelessness in preparing the surface, in removing inferior paint and grease or in painting when the surface is not thoroughly dry. The inspection should be made by the bridge and building supervisor jointly with the paint foreman and the carpenter foreman who will be assigned to make the repairs.

It is our practice to make an inspection of all buildings in the fall in connection with the preparation of the budget, but we also make a later and more detailed inspection prior to carrying out the programmed work of repairs and painting.

By All Means

By Supervisor of Bridges and Buildings

Before any wood surface is painted it should be given a thorough inspection to determine its condition; the condition of the old paint if it is a repainting job; the kind of wood; the presence of grease spots, knots or exuding resin; and any other defects that must be given attention. This preliminary inspection is important, for decayed wood, grease or water-soaked surfaces, loose or failing paint and resin will cause the new paint film to fail in a relatively short time. Again some woods have wide bands of spring wood that require special treatment in priming.

If the surface has been painted previously, and no blistering, peeling or alligatoring is in evidence, grease can be removed by washing the surface with mineral spirits of some prepared cleaning compound. If the paint is sound and shows signs of chalking only, a stiff brush will prepare the surface. If it has deteriorated badly it may be necessary to burn it off, but care should be exercised not to scorch the wood or the new paint will show signs of spotting in a few months.

Where the old paint needs to be removed only in spots, the edges of the paint remaining should be sandpapered to a fine edge to avoid unsightly lines after the new paint is applied. If the surface is badly weathered and the grain is ridged, it should be sandpapered to smooth it. Both old and new wood surfaces require such a variety of treatments that it is not safe to allow them to be painted unless they have been inspected in complete detail to determine what form the treatment should take.

Controlling Switch-Tie Renewals

What is the most satisfactory method of inspecting and controlling switch-tie renewals? How does this differ from crossties?

Make Spot Renewals

By R. L. Fox
Roadmaster, Southern, Alexandria, Va.

For many years, when switch ties were not treated, most of them were purchased on the division on which they were to be used. This timber was usually so located that when a section or extra-gang foreman was working over a turnout, he could get almost any ties he wanted and, in about 90 per cent of the cases he would renew the set out of face, not patching or making spot renewals of the ties that were decayed or failing from other causes. In those days, if a foreman lacked a tie of proper length he cut a longer tie to fit.

With the advent of ties of longer life, such as cypress and creosoted timber, the conditions surrounding switch-tie renewals have changed. When we first began to receive this longer-life material, the ties were shipped in sets and unloaded at stations on the division. Even after marking the failed ties in the turnout, it was hard to keep the foreman from renewing the complete set of switch ties when he started working through the switch, if there were a considerable number of decayed ties in the switch and the new ties were convenient. After this experience we established a switch-tie yard at division headquarters where all switch ties are received and stored.

The supervisor and foreman now make an inspection of the turnout, marking the decayed ties and furnishing the division office with the track number, the location, the length of the ties needed and the date they are to be used. The result is that when the foreman receives the ties he has the number of ties and the correct lengths he will require to patch or renew the turnout. Under this system there is no new timber left for the foreman to rehandle and none is wasted. We have found that we are saving timber by this method and at the same time we are maintaining our turnouts in a more uniform condition.

There is no relative difference in the method of inspecting crossties and switch ties. We require our supervisors to inspect all ties removed in making replacements and, when possible, in company with the foreman, he marks the ties to be renewed.

Make Careful Inspection

By C. D. Turley
General Tie Inspector, Illinois Central, Chicago

One of the important duties of a division engineer is to keep his superior officers acquainted with the general tie conditions on his division and to inform them concerning the probable renewals for the following year. For this reason, an annual tie inspection should be made in the fall, after the renewals for the current year have been completed ordinarily late in October or early in November. Switch ties should be included in this inspection and the conditions found at each switch should be recorded in detail. The information obtained from this inspection should be used in determining the renewals for the ensuing year.

The section foreman, who is most familiar with the general condition of his track and with the traffic demands upon it, should inspect the turnouts and make recommendations for switch tie renewals. The supervisor, who is familiar with the district, should discuss the proposed renewals with the foreman and with him make a joint check of at least part of the section.

Next, the division engineer, who is responsible for the switch-tie conditions on the entire division, should explain to the supervisors the plan and policy to be followed. He should check a portion of each supervisor's district to make sure that the instructions are understood and are being followed, and that a safe and uniform condition exists over the division as a whole.

Crossties are inspected individually to determine the number to be renewed by miles or districts, while switch ties are inspected by sets. There is no fundamental difference in the method of inspection, but owing to the nature of the traffic demands, switch ties require a higher standard of maintenance than crossties.

Where to Place Pipes

What are the relative advantages and disadvantages of placing steam, air and water lines overhead and underground?

Differ Greatly

By C. R. Knowles
Superintendent Water Service, Illinois Central, Chicago

Because of the widely different characteristics of steam, air and water, it is impossible to discuss the location of pipe lines handling these dissimilar substances under one general heading, but each particular service must be considered separately. As a rule, it is advisable to place steam lines above ground wherever it is possible to do so. In most instances this will prove to be more economical than placing them underground, and at the same time will make them more readily accessible for repairs.

Unless placed in tunnels or dry conduits, underground steam lines will give constant trouble and will result in excessive waste except where protected against moisture and radiation losses. In every case, steam lines should be insulated thoroughly to prevent radiation losses and excessive condensation. It has been the practice in some cases, when laying steam lines underground, to insulate them with acceptable pipe coverings and encase them in concrete. This has not been satisfactory, however, since expansion and contraction induced by differences in temperature causes the concrete encasement to crack, admitting water which destroys the insulation.

Air lines may be installed either above or below ground as desired, provided the line is protected properly. When air lines are laid underground, they should be protected against the action of cinders or corrosive soil and preferably should be laid in clay. The pipe should be given a protective coating, preferably of some petroleum-base compound containing a corrosion inhibitor. It should also be wrapped with a cloth wrapper which is impregnated with an anticorrosion compound. Where practicable, it is desirable to place air lines above ground to permit frequent inspection and give more ready access for making repairs.

In all cases, with both steam and air lines, it is of the greatest importance that proper attention be given to provisions for expansion and for trapping and disposing of condensation. While frost protection is not as important for air lines as for steam and water lines, precautions should be taken to insure against freezing, for water will accumulate in air lines unless measures are taken to remove the moisture before the air is introduced into the pipe.

Generally speaking, water mains should be placed underground. Most water lines are constructed of cast iron pipe. No protection is necessary for cast iron pipe lines, except to bury them in an anticorrosive soil below the frost line. Expansion joints are not necessary for cast iron pipe lines laid underground. If it becomes necessary to place water lines above ground, they should be protected against freezing and should be provided with expansion joints. In most cases, water lines that are placed above ground are constructed of wrought iron or steel pipe and, in some instances, joints are used which allow expansion and contraction to take place. However, a pipe line of any considerable length, with either screwed or welded joints, will need to be equipped with expansion joints.

Can Be Seen

By G. A. Belden
Engineer of Bridges and Buildings, Central of Georgia, Savannah, Ga.

One of the most important advantages of placing steam, air and water lines overhead is that they are always available for inspection and they can be repaired quickly and at minimum cost. Unless underground pipe lines are placed in well-ventilated pipe tunnels, they cannot be inspected and, when leaks occur and repairs become necessary, the cost of locating the leaks and making the repairs is considerably greater than for pipe that is exposed and easily accessible.

Unless well protected, overhead or exposed piping is subject to damage from freezing and is more or less un-

sightly. In some cases, as where there are numerous tracks to cross, the cost of installing the pipe to maintain the necessary horizontal and vertical clearances, may be prohibitive. In some shop buildings overhead piping, with the necessary drops, may be in the way of cranes or of machine operations.

In enginehouses, warehouses, and many depots, service pipes can be suspended overhead, along walls or in attic spaces and will generally be more satisfactory than pipes that are placed under floors. Service pipes in yards may have to be placed underground, because of restricted space, but some provision should be made for getting at them for repairs when necessary.

It is doubtful whether any inflexible policy can be adopted with respect to the installation of service piping, since each case should be studied on its merits, giving consideration to the necessity for providing uninterrupted service and holding future maintenance to the minimum. Where it becomes necessary to install pipe lines underground, and the funds available will not permit the construction of an adequate pipe tunnel, serious study should be given to the use of materials and types of fittings and joints that will be least affected by corrosion and other causes of pipe failure.

Why Does Rail Creep?

What effect, if any, do the weight of rail, the kind or amount of ballast, the condition of the roadbed and temperature have on rail creepage?

There Are Many Factors

By C. W. Baldridge
Assistant Engineer, Atchison, Topeka & Santa Fe, Chicago

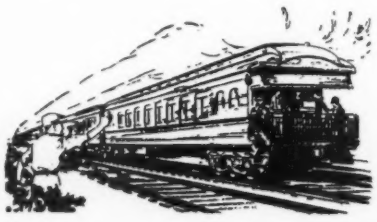
My first experience with troublesome rail creepage was on a single-track line to a coal field, with empty cars to the mines and heavily loaded cars returning. The road crossed a river on a four-span truss bridge with a one-fourth mile trestle approach. The trestle had 16-ft. spans, with six stringers, and proved to be a very flexible support for the track. The rail was 70 lb. and the grade was ascending in the loaded direction, beginning almost at the end of the bridge. In this case, we were confronted with excessive creepage up the hill. Since then, many other troublesome cases of rail creepage have been encountered.

Several forces, at times, affect the amount and direction of rail creepage. Next to wave motion, the most important cause seems to be the tractive pull exerted by the driving wheels when the locomotive is pulling the train. It requires a force to pull the train, and that force must act upon the rail through the friction between the wheel tread and the rail head. For a body at rest to remain at rest, either there must be no forces acting upon it or the forces must be equal and opposite. For the rails under the wheels to remain at rest, the friction between the rails and the ties must equal the force delivered by the driving wheels, and it must act in the opposite direction. This force will tend to cause creepage of the rail, to the extent that it is unbalanced, and in the direction opposite to the movement of the train. Likewise, when steam is shut off and the brakes are applied, the braking force acts in the direction of the train movement and the resistance must be in the opposite direction.

Curvature and grade have some and frequently differing effects on rail creepage, as a result of speed and braking, or lack of braking. There are many cases where the condition of the roadbed has much effect, as across a peat bog, where the unstable support allows a greater amount of wave motion. All of these and perhaps other factors cause marked variations in the phenomena of rail creepage.

The effect of heavier rails, particularly of greater height, is to provide a stiffer support for the wheel loads passing over them; consequently there is less wave motion, and reduced creepage. The kind of ballast affects the stiffness of the track. The mixture of marine shells and gravel used for ballast in some coast regions produces a spongy, springy, support for the ties; at the other extreme is high-grade crushed rock, which provides a harder and stiffer support. The depth of ballast has some effect upon the stability of the tie and rail support.

Changes of temperature alone should have no effect on the creeping of rail since expansion and contraction act equally in opposite directions and these nullify each other. A rail on a rail rest passes through the same temperature range as those in the track, yet it does not creep. On the other hand, a frozen roadbed is less flexible than one that is unfrozen, with consequent reduced creepage. The oddities of rail creepage in opposite directions on opposite sides of the track, or at different points in the same side of the track, doubtless result from various combinations and variations of the forces which act to cause creepage. A careful study of each case will be necessary to determine why these oddities occur.



Effect Is Conjectural

By W. L. Roller
Division Engineer, Chesapeake & Ohio, Columbus, Ohio

In general, rails creep in the direction of the predominate movement of traffic, although in many cases the rails move backward in reverse to the direction of traffic. Usually, in such cases, other conditions can be found or are disclosed which, if analyzed, may explain the apparent contradiction and actually confirm the conclusion that creepage is in the direction of major traffic movement. There also seems to be a direct relation between the tonnage passing over the rails and the extent of the creepage. In other words, rail is more prone to creep under heavy than under light wheel loads, and each car or engine wheel contributes its bit to the total creepage.

It is the theory that, if unrestrained, rail under load would resemble a worm creeping. The wheels create a slight depression, with a corresponding lift immediately ahead, so that as they move the rail has an undulating or wave motion. This action occurs even on the most rigid roadbed, and can usually be discerned quite easily by eye. This wave action results in an actual forward movement of the rail in the direction the train is moving. To arrest or impede this movement, anti-creepers are employed to transfer the force that is being applied to the rail down through the tie to the ballast and roadbed.

Although the effects of the weight of the rail, the kind and amount of ballast and temperature are largely conjectural, and difficult of proof, it is believed that each does have its effect on the amount or extent of rail creepage, either in resistance to or promotion of this action. If we had a completely rigid roadbed and track

structure, there would be little, if any, rail creepage, since the wheels would then be incapable of producing wave motion. By the same token, any device that can be employed to reduce this wave action and give more rigidity to the track and roadbed will reduce creepage. Heavier rail sections with greater girder effect will minimize rail creepage, and ballast sections of greater depth and solidity will do the same. Ballast of greater angularity will give more solid and effective support to the track and at the same time will offer more resistance to the longitude movement of crossties to which anti-creepers are applied. Freezing temperatures render the ballast and roadbed more rigid and thus probably effect some reduction in the wave action of the rail, reducing creepage.

There is some question whether an absolutely rigid roadbed is desirable. There is need for some resiliency to compensate for our rigid equipment. Furthermore, in the orthodox construction of track on the American railways, the rail is designed to ply freely over the ties instead of being anchored firmly to the ties and roadbed. For these reasons, it seems clear that means should be employed to prevent creepage, rather than to go to more rigid construction.

Electrically-Operated Tools

In what ways can electrically-operated tools be used to advantage in bridge and building work?

Of Deepest Interest

By L. G. Byrd
Supervisor Bridges and Buildings, Missouri Pacific, Poplar Bluff, Mo.

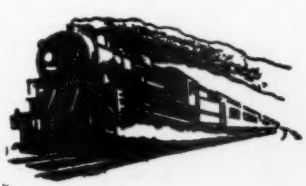
Few subjects are of deeper interest to maintenance officers than those concerning the use of power machines and power tools, and the methods best adapted for obtaining the maximum benefits from their use. In the past, many man-hours have been wasted, as seen from our present point of view, in constructing and repairing bridges and buildings because we followed the slow methods imposed by the use of hand tools. Today, a variety of electrically-operated tools are available to any one who desires to use them, which will save from 50 to 75 per cent of the man-hours, compared with hand methods. Yet we have many men who favor the use of hand augers, two-men cross-cut saws, hand framing saws and hand wrenches for tightening bolts.

My experience on our own line, as well as that of other roads, has convinced me that electric power tools are of great advantage in erecting and repairing bridges and buildings, in that members can be placed or replaced in service more quickly, with large savings in the labor cost. This saving may be greater than the cost of the material placed in the structure.

It is our practice to preframe all timber used in the construction of bridges, except the piles, and preframing costs can be cut in half if the work is done with electrically-operated tools. The piles must be cut off after they are driven and this work can be done at 50 to 75 per cent less cost with chain saws than by hand. In the same way, sash and other bracing can be applied with equal savings where impact wrenches and electrically-operated boring tools are used for forming the bolt holes and tightening the nuts. These are only examples of many other items applying to both bridges and buildings, in which electric-driven tools can be used to advantage.

Where a building is to be constructed which requires a large amount of framing on the job, the electric hand saw and one man will perform more work than three men with hand saws; the same saving applies to lag-screw drivers, nut tighteners, drills and wood borers, with which most of the work pertaining to bridges and buildings of wood construction is performed.

There are many portable electric-driven power units on the market, light of weight and easily portable, which can be moved from point to point or placed in the location most convenient for performing the work. Man-hours can be reduced materially with such equipment in operation, although the repairs to a particular bridge may consist of only a few frame bents to be erected or the reframing and placing of a few stringers, sway braces, etc. Again, even though the work may consist of the renewal of only a few square feet of wood platform, the use of the power tools will be of decided advantage. In addition to those tools that have been mentioned, there are other electric-driven tools that can be used to the same advantage by bridge and building forces, such as jackhammers, concrete breakers, concrete vibrators, riveting hammers, chipping and scaling tools and rotary wire brushes.



It is generally agreed that the primary purpose of using electrically-operated tools in the performance of all types of work on bridges and buildings is to reduce the unit cost of the work. However, there are other advantages that must not be lost sight of, among which it is conceded that the quality of the work performed by these tools is much better and more uniform than that done by hand.

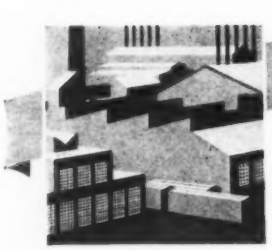
In Every Way

By General Inspector of Buildings

When one compares the time consumed by hand methods, whether in cutting a piece of siding, a joist, a sheathing board or a pile, and the remarkable reduction in time that can be made by using power tools, the advantages of this equipment are scarcely open to debate. Obviously, to realize these advantages, however, the job must be of sufficient magnitude to warrant the assignment of a power unit for the operation of the tools.

When a bridge is to be renewed or a building is to be erected, remodeled, enlarged, or to be given major repairs, it is extremely wasteful, according to present-day standards, to allow the work to be performed with hand tools. I have in mind a case where a large number of heavy untreated timbers were required, each of which required eight holes bored in it. This was a hurry-up job and the timbers were being placed rapidly, so that 24 men with ship augers were required to keep up with the demand. When power augers were obtained, six men easily kept ahead of this demand and the work was less fatiguing.

In recent years there has been a marked reduction in the amount of field framing in connection with the construction and maintenance of wood trestles and other structures requiring the installation of heavy timbers. This work is now being done at the treating plant before the timbers go to the retorts; but here also electric-driven tools have demonstrated their economic value to as great an extent as in the field. I prefer electric tools because they are light and the power plants are so easily portable that they can be placed at the most advantageous points on the work.



PRODUCTS of Manufacturers

Buda Two- to Four-Man Inspection Car

MODEL F-2, a new two- to four-man inspection car, named the Buda Roadmaster, has been developed by the Buda Company, Harvey, Ill., especially for use by roadmasters, supervisors and others who require a light but larger and more powerful car than the Buda Model F-1*, one- or two-man light inspection car. Safe operation, smooth riding, long life and plenty of deck room are said to be the principal features of this car.

The Buda Roadmaster has an all-steel electrically-welded frame with a safety rail on the front end. The motor is a Briggs and Stratton four-cycle, air-cooled, gasoline engine, which is coupled to the drive axle by a heavy-duty friction drive clutch and a roller chain drive. The front axle is of the Buda patented ball-bearing differential type, which allows one wheel to turn independent of the other.

The Buda Roadmaster Is a Light Inspection Car, Designed for Two to Four Men

This car is designed with two forward-facing seats and a center deck over the engine, which will accommodate two additional passengers if desired. Deck space is provided along one side for the full length of the car and behind the engine and the drivers seat. A tool compartment is located under the drivers seat. The car is equipped with four-wheel brakes and safety skid wheels. Although the total weight is 680 lb., the rear lift required on the end of the handles is only 95 lb.

The controls of the motor car are located within easy reach of the operator when sitting in a forward-facing position. It is said that the engine of this car has more than enough power to maintain its full range of speed with capacity loads and that it will start easily in cold weather, is low in oil consumption and economical in fuel consumption. The roller chain drive is unaffected by rain or snow. The Buda Roadmaster is available with all the standard motor car accessories and can be ordered for special gage tracks.

*Described in the October, 1941, issue, page 722.

New Series of Track Jacks

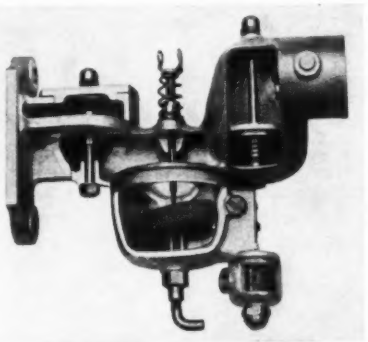
A NEW line of track jacks with capacities of 15 and 20 tons, which are designed to lift the heaviest as well as lightest rails and which incorporate a number of safety features, has been developed by the Joyce-Cridland Company, Dayton, Ohio. The jacks are the single-acting type, with enclosed coiled springs which actuate both the lifting and retaining pawls. The lifting pawl spring is protected and concealed within the lever trunnion. The teeth on the lift rack have a finer pitch on the 20-ton jacks, which provides a very short stroke and easy operation.

A stronger base is provided by additional rib reinforcing on the housing and the jacks have a long gently-sloping nose which swings easily under the base of the rail when the operator swings the jack by its carrying handle. The carrying handle on the 11-in. models is a large hinged ring, instead of the usual fixed handle, which is designed to provide ample clearance between the lever and handle to prevent finger pinching. Another safety feature is the removal of the ride stop or lift bar cap and the provision of longer and larger finger pins. These features help prevent injury to fingers and permit faster speed with safety in the operation of the jacks. The 15-ton jack is available in 11-in., 14-in., 22-in., and 28-in. heights, and the 20-ton jacks in 11-in. and 14-in. heights.

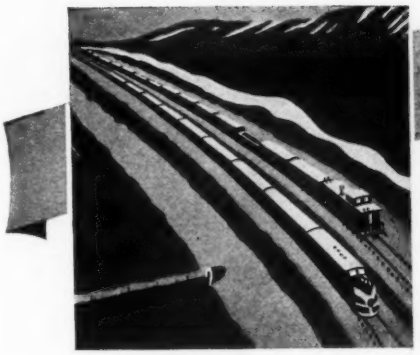
The New Track Jacks Incorporate a Number of Safety Features

New Fairmont Hy-Economy Carburetor

AS THE result of a comprehensive study of motor car carburetors, Fairmont Railway Motors, Inc., has designed a carburetor to increase the horsepower output and improve the performance of its motor car engines. The new carburetor, named the Hy-Economy carburetor, incorporates a number of features which are said to improve its operation, such as a larger air valve which allows a greater volume of air to pass and a cylindrical strainer in the strainer bowl which helps keep the fuel clean. The new carburetor is also easier and more economical to maintain, since all wearing parts, even including the seats for the needle, air, check and float valves, are easily renewable, thus eliminating the necessity of scrapping an entire carburetor when several parts become badly worn. It is said that the carburetor responds quickly to throttle control, instantly supplying the engine with more or less fuel as desired and can be adjusted to provide maximum performance under all conditions.



Part Cut-Away View of the New Hy-Economy Carburetor



NEWS of the Month

Equipment Manufacturers Asked to Freeze Prices

Manufacturers of railroad freight and passenger cars, locomotives and maintenance of way and signal equipment have been asked not to increase prices above the level in effect on October 1, 1941, Leon Henderson, administrator, Office of Price Administration, announced on November 21.

The request, in the form of a letter, stated that OPA is studying the entire railroad equipment field. To get first-hand information on price problems, policies and procedure, meetings of OPA with various railroad equipment manufacturers and producers were held during November in Washington, D. C., the meeting with those producing maintenance of way equipment being held on November 19.

Mr. Henderson's letter also requested manufacturers not to change their practices with regard to extra charges, discounts, allowances or concessions, and to continue to use the same methods of pricing specially designed equipment "so that the price set on special equipment will be the same as would have been set had the estimates been made on October 1, 1941."

"In making these requests," the administrator's letter added, "I recognize that you may have had certain cost increases in respect to labor and materials. This is offset by the fact that most companies are presently operating close to capacity and that overhead per unit of production has shown a tendency to fall. It is likewise a matter of importance that a ceiling has been placed on the price of steel, the major component of railroad equipment."

End Eastern Oil Restrictions

The so-called east coast gasoline shortage ended on October 23, when Petroleum Co-ordinator Ickes announced that he had reached an agreement with representatives of the British government for the return of 25 additional oil tankers to normal American service by November 30. At the same time Mr. Ickes stated that he had asked Donald Nelson, director of priorities of the Office of Production Management, to lift the restrictions on the sale of gasoline during the hours from seven in the evening until seven in the morning at once. This, Mr. Nelson did the next day.

Mr. Ickes was generous enough to include the railroads among those agencies which helped to end the alleged shortage. "Intensified use of available transportation; the combined use of pipeline, barge, and rail deliveries of oil; greater efficiencies in the use of tankers remaining in the trade; the conservation of supplies, and similar measures put into effect by the Co-ordinator's Office steadily cut the deficit."

Emergency Board Report— Unions Set Strike Dates

On November 5, the Emergency Board recommended to President Roosevelt that employees of the five operating brotherhoods be granted a wage increase of 7½ per cent and the employees of the non-operating unions be granted a wage increase of 9 cents per hour (equivalent of a 13½ per cent increase), a week's vacation of 6 consecutive working days with pay each year and a minimum wage of 45 cents an hour, except on short lines, which should have a minimum wage of 40 cents an hour. The increases were recommended as temporary additions to wages, to terminate automatically on December 31, 1942.

Both the railroad managements and the unions expressed disappointment with the report of the Board. The railroad managements, however, as represented by the carriers' conference committees, accepted the recommendations. The five operating brotherhoods rejected the recommendations, and set 6 a.m. on December 7, 8 and 9 for a strike. The non-operating unions issued a statement objecting strongly to the Emergency Board's report, but have not definitely announced that they will strike.

On November 18, conferences were begun in Washington, D. C., by President Roosevelt with a group of government, railroad and labor representatives in an effort to arrive at an agreement.

Steel Capacity Is Adequate for Most Needs

Aside from a few specialized alloys, American steel producing capacity is great enough to satisfy every conceivable demand of defense and aid under the Lend-Lease Act and leave enough over to keep our non-defense industries from starving, according to John H. Van Deventer, president and editor of "Iron Age," in an address before the Executives Club at Chicago on October 31.

"No studies or estimates yet made," he continued, "have shown how these defense uses of steel can possibly use more than 40 per cent of our present capacity. That is an outside figure. On the basis of our present ingot-producing rate of 80 million tons, the remaining 60 per cent which should be available to non-defense industries amounts to 48 million tons, or enough to permit these non-defense industries to do business almost on their 1939 basis. During that year our total ingot production was 52½ million tons, and that included considerable aid to France and England on the 'cash on the barrel-head' plan.

"So long as we have at least 60 per cent of our present steel-making capacity theoretically available for non-defense business, the chief reason for anyone not getting at least some steel is maldistribution. We have priorities, and having priorities—in the way that we have had them, we have got ourselves into a mess because priorities are being used as a substitute for planning!"

Twenty Killed in Three Accidents

Three serious railroad accidents occurred (on the Pennsylvania, the Southern Pacific and the Illinois Central) in November, in which 20 persons were killed and 124 were injured. Thirteen persons, including the fireman, were killed and 44 persons were injured when the "Pennsylvanian" of the Pennsylvania, enroute from Chicago to New York, was derailed in an unusual accident at Dunkirk, Ohio, on November 9. As this eight car train was proceeding through Dunkirk, the left front cylinder-head on the locomotive of a 48-car freight train running from Crestline, Ohio, to Ft. Wayne, Ind., on the adjoining westbound track blew out and fell on the rail in front of the oncoming eastbound passenger train just west of the station. Immediately thereafter the locomotive of the Pennsylvanian struck the cylinder-head and it and the eight cars left the rails. The locomotive and seven cars turned over, while the rear truck of the last car remained on the rails.

In the Southern Pacific accident, a 96-car freight train became stalled in the 7000-ft. Hasson tunnel near Hasson, Cal., on November 19, when a coupler broke. The engineer, fireman, brakeman, two trespassers and 300 steers were suffocated when the train caught fire from sparks from the locomotive.

On the Illinois Central, two persons were killed and 80 were injured when 9 of the 12 cars of the Northbound Seminole were derailed and 8 rolled down a 33-ft. embankment one mile south of Corinth, Miss., at 5:15 p.m. on November 23. It was reported that a transverse fissure in the east rail caused the derailment.

Personal Mention

General

W. B. Bailes, track supervisor on the Southern, with headquarters at Charlottesville, Va., has been promoted to trainmaster, with headquarters at Winston-Salem, N. C.

Guy S. Smith, division engineer of the Joplin-White River divisions of the Missouri Pacific, with headquarters at Nevada, Mo., has been promoted to assistant superintendent of those divisions, with the same headquarters.

Frank H. Cook, assistant chief engineer on the International-Great Northern (part of the Missouri Pacific Lines), with headquarters at Palestine, Tex., has been promoted to superintendent of the Palestine-San Antonio divisions, with the same headquarters.

Harold G. Watkins, general superintendent and chief engineer of the Akron, Canton & Youngstown and the Northern Ohio, has been appointed chief operating officer, with headquarters as before at Akron, Ohio, a change of title. The positions of general superintendent and chief engineer have been abolished.

John Hewes, Jr., superintendent of transportation of the Baltimore & Ohio, with headquarters at Pittsburgh, Pa., and an engineer by training and experience, has been appointed superintendent of car service, with headquarters at Baltimore, Md. Mr. Hewes entered the service of the Baltimore & Ohio in 1905 as an axe-

John Hewes, Jr.

man in the engineering department and for the next six years served successively as chainman, rodman, levelman and transitman. In 1914 he was appointed bridge inspector at Cincinnati, Ohio, and became assistant superintendent of the Ohio division at Hamden, Ohio, the next year. He was appointed a draftsman in the chief engineer's office in 1916, field engineer in 1917, assistant engineer in 1918, and division engineer at Flora, Ill., the same year. Mr. Hewes was appointed assistant superintendent at Akron, Ohio, in 1925 and was advanced to transportation assistant at Pittsburgh on June 15, 1929. He was later promoted to superintendent at Newark, Ohio, and on November 1, 1938, he became superintendent of transportation at Pittsburgh, the position he held until his recent appointment.

George G. Haines, assistant superintendent of the Philadelphia, Bethlehem & New England, with headquarters at Bethlehem, Pa., and a maintenance officer by training and experience, has been elected vice-president and general manager of the Cornwall railroad, with headquarters at Lebanon, Pa. Mr. Haines was born at Cleveland, Ohio, and was graduated from the University of Pennsylvania in 1922. He entered railroad service with the Atchison, Topeka & Santa Fe at Topeka, Kan., later serving with the Philadelphia, Bethlehem & New England as supervisor of track and general yardmaster. He became assistant superintendent of the latter road in December, 1939.

Engineering

Raymond J. Pierce, assistant division engineer on the Erie at Hornell, N. Y., has been transferred to Salamanca, N. Y., to replace **Louis M. Rossman,** who has, in turn, been transferred to Hornell.

C. P. Schantz has been appointed assistant chief engineer of maintenance of way of the Eastern region of the Pennsylvania, with headquarters at Philadelphia, Pa., succeeding **D. P. Beach,** retired.

Orie H. Wainscott, assistant engineer on the Illinois Central System, with headquarters at Chicago, has been promoted to assistant to the engineer maintenance of way, with the same headquarters, a newly created position.

Clyde Hightower has been appointed engineering assistant on the Denver & Rio Grande Western at Denver, Colo., succeeding **W. H. Lowther,** whose return to the Union Pacific as division engineer at Denver was reported in the November issue.

G. L. Morrison, assistant terminal superintendent on the Southern Pacific at Los Angeles, Cal., has been appointed division engineer of the Salt Lake division, with headquarters at Ogden, Utah, succeeding **Frederick A. Feikert,** whose death on September 27 was reported in the November issue.

C. D. Mackintosh, division engineer on the Canadian Pacific at Kenora, Ont., has been appointed division engineer and assistant superintendent of the Esquimalt & Nanaimo (leased by the Canadian Pacific), with headquarters at Victoria, B.C., and **W. M. Stokes,** engineer of the Esquimalt & Nanaimo, has retired because of ill health. **S. C. Wilcox,** division engineer on the Canadian Pacific, with headquarters at Brandon, Man., has been transferred to Kenora, Ont., succeeding Mr. Mackintosh, and **R. A. Emerson,** roadmaster at Virden, Man., has been promoted to division engineer at Brandon, relieving Mr. Wilcox.

Spencer Danby, division engineer of the Maryland division of the Pennsylvania, with headquarters at Baltimore, Md., has been promoted to assistant valuation engineer, with headquarters at Philadelphia, Pa. Mr. Danby was born at Easton, Pa., in 1893 and was graduated in civil engineering from Lafayette College. He entered the service of the Pennsylvania

Spencer Danby

in 1915 as a draftsman and served in various engineering capacities, including supervisor, assistant division engineer and division engineer.

Henry C. Archibald, division engineer of the Portland division of the Boston & Maine, with headquarters at Dover, N. H., has been appointed acting engineer of track, with headquarters at Boston, Mass., to succeed **Guy H. Watson,** who has been granted a leave of absence. **Harold S. Ashley,** who was construction engineer in charge of the recently-completed relocation project at the Birch Hill Dam reservoir, has been appointed acting division engineer of the Portland division, with headquarters at Dover, to succeed Mr. Archibald.

Robert E. Kennedy, whose promotion to assistant to the chief engineer of the Baltimore & Ohio, with headquarters at Baltimore, Md., was reported in the November issue, was born on December 3, 1885, at Carrollton, Ohio, and entered railroad service in May, 1901, as an assistant with the maintenance of way department

Robert E. Kennedy

of the Baltimore & Ohio. From December 1, 1906, to December 3, 1909, he served as assistant city engineer, Alliance, Ohio, returning to the B. & O. on February 4, 1910, then serving successively as axeman,

rodman, levelman, rodman, chainman, levelman, and transitman. On March 16, 1914, Mr. Kennedy was transferred to the valuation department, where he became chief of party on March 1, 1916, and pilot engineer on April 16, 1916. In June, 1916, he was furloughed for military service, re-entering the valuation department as pilot engineer in June, 1920. On June 1, 1927, Mr. Kennedy was appointed special engineer in the valuation department, being transferred to the office of the auditor of capital expenditures on October 16, 1939, the position he held until his recent promotion.

Karl J. Wagoner, whose promotion to district engineer on the Baltimore & Ohio, with headquarters at Pittsburgh, Pa., was reported in the November issue, was born on December 21, 1892, at Davis, W. Va. He attended Conway Hall Prep school, Carlisle, Pa., and was graduated from West Virginia Wesleyan, Buckhannon, W. Va., in June, 1917. He entered railroad service in June, 1917, as a rodman with the Baltimore & Ohio. In October, 1917, he was promoted to levelman and in March, 1918, he was appointed a transitman. He became field engineer in October, 1918, and in April, 1926, he was appointed assistant engineer at Pittsburgh, the position he held until his recent promotion.

Karl J. Wagoner

G. R. Sproles, whose promotion to assistant engineer on the Louisville & Nashville, with headquarters at Louisville, Ky., was reported in the November issue, was born at Corbin, Ky., on May 4, 1912, and graduated in civil engineering from the University of Kentucky in 1936. After graduation he worked for the Kentucky Department of Highways and in March, 1937, he entered railway service as a draftsman for the L. & N. in the bridge department in the chief engineer's office.

James P. Ray, whose promotion to district engineer on the Baltimore & Ohio, with headquarters at Cincinnati, Ohio, was reported in the November issue, was born on January 21, 1889, at Baltimore, Md., and attended the Polytechnic Institute at Baltimore and Lehigh University. He entered railroad service on April 1, 1910, with the Baltimore & Ohio as a chainman on the Lumberport (W. Va.) cut-off, being promoted to levelman on May 1, 1911. From April 1 to November 1, 1915, Mr. Ray served as a draftsman for the Cleveland, Cincinnati, Chicago & St. Louis, returning to the Baltimore & Ohio on the latter date in a similar capacity. On September 1, 1916, he became field engineer, and on August 1, 1920, he was appointed assistant engineer, the position he held until his recent promotion. Mr. Ray was engineer in charge of the reconstruction of Bridge 19/95 over the Great Miami river in 1920-1921.

James P. Ray

William W. Gwathmey, Jr., whose promotion to district engineer on the Baltimore & Ohio, with headquarters at Baltimore, Md., was reported in the November issue, was born on January 18, 1889, and entered railroad service on July 24, 1911, as an axeman with the Baltimore & Ohio, becoming a chainman on December 14, 1911. Mr. Gwathmey was appointed rodman on February 1, 1912; chainman on July 1, 1913; rodman on October 1, 1913; transitman on December 1, 1915; assistant resident engineer on July 1, 1916; and field engineer on September 1, 1916. He was furloughed for military duty on May 30, 1917, returning to the Baltimore & Ohio on August 13, 1919, as a transitman. He was appointed field engineer on March 1, 1923, becoming assistant engineer at Baltimore on April 1, 1924. He became resident engineer at Baltimore on October 1, 1935, and on July 1, 1936, he again became assistant engineer there, which position he held at the time of his recent appointment.

William W. Gwathmey, Jr.

W. E. Quinn, whose appointment as assistant engineer on the Louisville & Nashville, with headquarters at Louisville, Ky., was reported in the November issue, was born at Sturgis, Ky., on October 31, 1901, and graduated in engineering from the University of Kentucky in 1923. He entered railway service in September, 1923, as a rodman on engineering maintenance at Ravenna, Ky., later being promoted to instrumentman and assistant engineer in the same territory.

Louis N. Riggan, whose promotion to engineer of construction of the Seaboard at Norfolk, Va., was reported in the November issue, was born on October 1, 1889, at Wake Forest, N. C. Mr. Riggan was graduated from North Carolina State College in 1912 and entered railroad service on August 10, 1912, with the Chicago, Milwaukee & St. Paul as a rodman, serving successively as levelman and inspector at Perry, Iowa. On April 15, 1913, Mr. Riggan went with the Seaboard Air Line as a draftsman at Portsmouth, Va., being transferred to the valuation department at Norfolk the following year. On January 3, 1916, he became an instrumentman at Jacksonville, Fla., and on October 20, 1917, a draftsman at Norfolk. He was appointed chief clerk to the chief engineer at Norfolk on December 15, 1917, and on July 5, 1922, became chief clerk, Budget Committee, at Norfolk. He became assistant chief clerk to the operating vice-president at Norfolk in 1924 and on March 15, 1926, he was appointed assistant engineer at Savannah, being transferred to Norfolk on September 1, 1930, the position he held until his recent promotion.

Louis N. Riggan

V. C. Hanna, whose appointment as assistant engineer in charge of construction of the Terminal Railroad Association of St. Louis, with headquarters at St. Louis, Mo., was reported in the October issue, was born at Prescott, Ark., on August 15, 1898, and graduated in civil engineering from the Alabama Polytechnic Institute. He entered railway service in May, 1923, as an assistant engineer on the Mobile & Ohio at Jackson, Tenn., and in September, 1924, he was promoted to track supervisor at Tusca-

loosa, Ala. In December, 1926, he was advanced to supervisor of bridges and buildings, with the same headquarters. Mr. Hanna was appointed assistant roadmaster at Murphysboro, Ill., in December, 1927, and in December, 1937, he was appointed assistant engineer at Jackson, Tenn. In August, 1941, he went with the Litchfield & Madison as engineer maintenance of way, with headquarters at Edwardsville, Ill., which position he held until his recent appointment.

William F. Rambo, roadmaster on the Missouri Pacific at Poplar Bluff, Mo., has been promoted to division engineer of the Joplin-White River divisions, with headquarters at Nevada, Mo., succeeding **Guy S. Smith,** whose promotion to assistant superintendent, with the same headquarters, is reported elsewhere in these columns. Mr. Rambo was born at Pollock, La., on October 15, 1892, and studied correspondence courses. He entered railway service on January 1, 1910, as a section laborer on the Louisiana division of the Missouri Pacific and on September 1, 1912, he was promoted to section foreman, serving in that capacity and as extra gang

William F. Rambo

foreman until September 1, 1925, when he was advanced to roadmaster, with headquarters at Gurdon, Ark. Mr. Rambo was later transferred successively to Dupo, Ill., St. Louis, Mo., and Poplar Bluff.

Track

Earl Long, roadmaster on the St. Louis-San Francisco at Amory, Miss., has been transferred to Ft. Scott, Kan., succeeding Abner Hamm, acting roadmaster, who has been assigned to other duties.

Lyle Bristow, supervisor of track on the New York Central (Big Four) at Paris, Ill., has been transferred to Middletown, Ohio, relieving **Fred Hiatt,** who, in turn, has been transferred to Paris, succeeding Mr. Bristow.

R. H. Malay, roadmaster on the Davenport, Rock Island & Northwestern at Davenport, Iowa, has returned to the Chicago, Burlington & Quincy as roadmaster at Centralia, Ill., relieving **L. L. Smith,** who has been transferred to Aurora, Ill. Mr. Smith succeeds to the duties of **J. Emerson,** whose death on November 6 is reported elsewhere in these columns.

C. G. Lybarger, assistant supervisor of track on the Pennsylvania at Rochester, Pa., has been promoted to supervisor of track, with headquarters at Logansport, Ind., succeeding **L. D. Shoda,** who has been transferred to Alliance, Ohio. Mr. Shoda replaces **A. J. Schaller,** who has been transferred to Aspinwall, Pa. **G. T. Weida,** general foreman on the Indianapolis division, has been promoted to assistant supervisor of track at Rochester, relieving Mr. Lybarger.

Albert W. Schroeder, Jr., whose promotion to roadmaster on the Chicago, Burlington & Quincy, with headquarters at Central City, Neb., was reported in the November issue, was born at Eustis, Neb., on January 2, 1917, and graduated in civil engineering from the University of Nebraska in 1938. From August 1, 1938, to May 1, 1939, he worked for the Nebraska Department of Roads and Irrigation, entering railroad service on the latter date as a junior civil engineer on the Burlington at Omaha, Neb. On January 1, 1940, he was promoted to track supervisor at Oxford, Neb., which position he held until his recent promotion.

A. Holmstrom, section foreman on the Canadian Pacific at Eagle River, Ont., has been promoted to roadmaster, with headquarters at Virden, Man., succeeding **R. A. Emerson,** whose promotion to division engineer, with headquarters at Brandon, Man., is reported elsewhere in these columns. **D. R. Johnston,** relieving roadmaster, has been advanced to roadmaster at Leader, Alta., replacing **H. W. Clarkson,** who has retired because of ill health. **T. J. Purdie,** roadmaster at Drumheller, Alta., has been transferred to Fernie, B. C., succeeding **T. R. Alexander,** whose promotion to assistant superintendent, with headquarters at Calgary, Alta., was reported in the November issue. **T. W. Hicks,** roadmaster at Princeton, B. C., has been transferred to Procter, B. C., relieving **S. Kozak,** who, in turn, has been transferred to Princeton, replacing Mr. Hicks. Similarly, **D. M. Dunlop,** roadmaster at Deloraine, Man., has been transferred to Ignace, Ont., succeeding **W. J. Montgomery,** who, in turn, has been transferred to Deloraine, replacing Mr. Dunlop.

Howard W. Martens, assistant supervisor of track on the Pennsylvania at New Brunswick, N. J., whose promotion to supervisor of track, with headquarters at Clayton, Del., was announced in the November issue, was born on May 8, 1914, at New York. Mr. Martens attended the Virginia Military Institute, graduating in civil engineering in 1935. He entered railway service with the Pennsylvania on October 1, 1935, as an engineering apprentice at Wilmington, Del. From April 1, 1936, to December 1, 1939, he served as an assistant on the engineering corps at various locations on the Middle, Philadelphia and Williamsport divisions. He was then promoted to assistant supervisor of track on the New York division at New Brunswick, which position he was holding at the time of his promotion to supervisor of track.

David Z. Gardner, Jr., whose promotion to roadmaster on the Atchison, Topeka & Santa Fe, with headquarters at Parker, Ariz., was reported in the November issue, was born at So. Pasadena, Cal., on April 30, 1906, and graduated in engineering from the California Institute of Technology in 1927. He entered railway service on July 13, 1928, as a chainman on location work on the Los Angeles division of the Santa Fe, later serving as chainman at various points on the Valley and San Francisco Terminal divisions. In August, 1929, he was promoted to rodman on the Arizona division, later being transferred to the Los Angeles division. In September, 1930, Mr. Gardner was appointed a chainman and in December, 1931, he was furloughed. He worked on various outside engineering jobs until February, 1934, when he returned to the Santa Fe as a chainman on the Albuquerque division. A year later he was promoted to rodman and in March, 1938, he was transferred to the Los Angeles division. Mr. Gardner was promoted to transitman at Grants, N. M., in October, 1939, and in March, 1940, he was transferred to Gallup, N. M., where he remained until his recent promotion, effective September 1.

Charles L. Elliott, whose promotion to roadmaster of the Northern division of the St. Louis-San Francisco, with headquarters at Neodesha, Kan., was reported in the September issue, was born at Mulberry, Kan., on November 1, 1877, and entered railway service on January 1, 1900, as a section laborer on the Kansas City, Ft. Scott & Memphis (now part of the St. Louis-San Francisco), On May 1, 1904, he was promoted to section foreman at Mulberry, Kan., and on October 27, 1907, he was promoted to extra gang foreman on the Northern division. In April, 1916, he was appointed acting roadmaster at Joplin, Mo., and six months later he was appointed assistant general foreman in charge of construction at Sapulpa, Okla. On February 1, 1919, he was appointed section foreman at Baxter Springs, Kan., and on November 15, 1919, he was promoted to roadmaster, with headquarters at Brownwood, Tex. Mr. Elliott returned to Baxter Springs as a section foreman on October 1, 1933, which position he held until his recent promotion, effective August 15.

W. F. Poole, a section foreman on the Southern, with headquarters at Spencer Yard, N. C., has been promoted to track supervisor with headquarters at Camden, S.C., to succeed **W. E. Manning,** who has been transferred to Orangeburg, S.C., to relieve **W. H. McNairy,** who has been transferred to Batesbury, S.C. Mr. McNairy succeeds **E. A. Gill,** who has been transferred to Blackville, S.C., to replace **G. S. King,** who goes to Chester, S.C., to succeed **W. C. Radford,** who has been transferred to Charlottesville, Va. Mr. Radford replaces **W. B. Bailes,** whose promotion to trainmaster is noted elsewhere in these columns.

W. Burton Barber, assistant track supervisor, with headquarters at Salisbury, N.C., has been promoted to track supervisor at Winston-Salem, N.C., to succeed **Walton Goodwin, III,** who has been called to active service in the United States Army. Mr. Goodwin holds a commission in the Officers' Reserve Corps of first lieutenant of cavalry. **R. H. Campbell,**

(Continued on page 896)

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student apprentice, has been promoted to assistant track supervisor at Spartanburg, S.C., succeeding Mr. Barber.

Mr. Barber was born on March 19, 1907, at Washington, D.C., and after a public school education, he studied at the enlisted specialists' school of the United States Army Engineers at Fort Humphreys, Va. He entered railway service with the Southern on June 19, 1929, as a rodman, being furloughed on July 1, 1931. He returned to the service of this road on February 1, 1932, as an extra force laborer, becoming a section laborer on February 1, 1933. After a year in the latter capacity Mr. Barber became a rodman, being appointed an apprentice section foreman on December 1, 1934. From December 1, 1936, to February 1, 1941, he served as a junior engineer on construction, transitman, rodman and student apprentice, then being promoted to assistant track supervisor, which position he held until his recent advancement to track supervisor.

Hugh Price, whose promotion to roadmaster on the Chicago, Rock Island & Pacific, with headquarters at St. Joseph, Mo., was reported in the October issue, was born at Unionville, Iowa, on September 18, 1902, and took various correspondence courses in engineering and maintenance of way work, also attending night school in Kansas City, Mo., in 1939 and 1940. He entered railway service in April, 1919, as a section laborer on the Rock Island at Udell, Iowa, and six months later went with the Wabash as a section laborer at Udell. In April, 1920, he returned to the Rock Island and in November, 1923, he was promoted to relief section foreman. Mr. Price was advanced to section foreman at Centerville, Iowa, on October 1, 1924, and served as section foreman at this point, except for a short period as assistant extra gang foreman on rail laying work in 1928, until February, 1929, when he was appointed yard section foreman at Centerville. He served in the latter capacity and as extra gang foreman on the Missouri division until April, 1939, when he was advanced to track supervisor in charge of the Armourdale yards, Kansas City, Kan., which position he held until his recent promotion.

James P. Davis, whose retirement as supervisor of track on the New York Central (Big Four) at Anderson, Ind., was reported in the October issue, was born at Houston, Ohio, on March 4, 1872, and entered railway service on May 1, 1889, as a section laborer on the Big Four at Dawson, Ohio, later being transferred to Ansonia, Ohio. On January 1, 1895, he was promoted to section foreman at Russia, Ohio, later being transferred successively to Martel, Ohio, and Anderson, Ind. On January 1, 1903, he went with the Central Indiana (jointly owned by the Pennsylvania and New York Central) as track supervisor, with the same headquarters, and two years later he returned to the Big Four as extra gang foreman, serving at Weisburg, Ind., and Lockland, Ohio. On May 2, 1906, Mr. Davis was advanced to supervisor of track at Harrisburg, Ill., and on September 1, 1907, he went with the Central Indiana as roadmaster, with headquarters at Anderson. On January 1, 1923, he was promoted to engineer maintenance of way, with the same headquarters, and on December 15, 1929, he was appointed supervisor of track on the Big Four at Connersville, Ind. Mr. Davis was transferred to Harrisburg on November 1, 1930, to Lynn, Ind., on May 1, 1936, and to Anderson on April 1, 1938, remaining at the latter point until his retirement, effective August 31.

Bridge and Building

J. L. Byrnes, bridge and building foreman on the Panhandle division of the Chicago, Rock Island & Pacific, has been promoted to acting master carpenter of the Western division, with headquarters at Fairbury, Neb., succeeding **F. W. Madison,** who has been assigned to other duties.

Lora Sullivan, whose promotion to general foreman of bridges and buildings on the Illinois Central, with headquarters at Carbondale, Ill., was reported in the October issue, was born at Goreville, Ill., on July 31, 1893, and entered railway service in November, 1915, as a carpenter on the Illinois Central. In April, 1916, he was appointed a bridge man and with the exception of several months in 1917, when he was employed as a special agent, he served in that capacity until March 1, 1923, when he was promoted to assistant bridge foreman. Mr. Sullivan was advanced to bridge foreman on February 24, 1925, which position he held until his recent promotion.

Edwin F. Bateman, a bridge and building foreman on the Union Pacific, has been promoted to bridge and building supervisor with headquarters at Nampa, Idaho. Mr. Bateman was born at Montpelier, Idaho, on January 11, 1904, and entered railway service in 1920 as a section laborer on the Union Pacific west of Montpelier. On July 11, 1923, he transferred to the bridge and building department as a carpenter helper and two months later he was promoted to carpenter, second class. Mr. Bateman was advanced to carpenter, first class, in 1929 and in 1935 he was appointed traveling carpenter between Pocatello, Idaho and Glenns Ferry, later being promoted to assistant foreman at Sun Valley, Idaho. In 1940 he was advanced to bridge and building foreman, which position he held until his recent promotion.

Special

Roy C. Sabens, a clerk and accountant in the engineering department of the New York, Chicago & St. Louis at Cleveland, Ohio, has been appointed supervisor of maintenance of way shop and equipment, a newly created position, with headquarters at Bellevue, Ohio. Mr. Sabens entered railway service on August 1, 1923, as a timekeeper on the Lake Erie & Western district of the Nickel Plate, and served as timekeeper, clerk and inspector during the next four years. On December 1, 1927, he was promoted to general foreman in the maintenance of way department at Chicago, and on October 1, 1928, he became supervisor-timekeeper on a grade elimination project at Cleveland. On September 15, 1932, he entered the general office of the engineering department at Cleveland, serving as a clerk and accountant until his recent appointment.

Obituary

Arley O. Bowers, retired supervisor of water supply on the Chesapeake & Ohio at Columbus, Ohio, died at his home in Toledo, Ohio, on September 9.

J. Emerson, roadmaster on the Chicago, Burlington & Quincy at Mendota, Ill., died of pneumonia on November 6 at the St. Mary's hospital, La Salle, Ill.

Einar Weidemann, engineer of bridges and buildings of the Western region of the Pennsylvania, with headquarters at Chicago, died suddenly of a heart attack at his office in the Union Station, Chicago, on November 12. Mr. Weidemann was born at Trondhjem, Norway, on May 29, 1877, and graduated from the Technical

Einar Weidemann

Institute in that city with the degree of civil engineer in 1897. He spent several years with the Norwegian government on railroad construction, coming to the United States in 1903, where he became a structural draftsman for the American Bridge Company at Pittsburgh, Pa. In the following year Mr. Weidemann became an assistant to Herman Laub (deceased), consulting engineer and bridge specialist of Pittsburgh, and on May 5, 1909, he was appointed an engineer of structural design on the Pennsylvania at the same point. On May 1, 1915, he was transferred to the Union Station Company, Chicago, as a structural engineer, being promoted to engineer of buildings and structures on that project on January 1, 1923. Mr. Weidemann returned to the Pennsylvania on June 6, 1926, with the dissolution of the engineering organization built up for the construction of the Union Station, as an assistant engineer at Chicago. On April 1, 1927, he was promoted to assistant engineer of bridges, with headquarters at Chicago, and on January 1, 1928, he was promoted to engineer of bridges and buildings of the Western region. He was later appointed officer engineer at Chicago, and in November, 1937, he was re-appointed engineer of bridges and buildings, Western region.

James F. Burns, who retired on December 31, 1931, as assistant engineer maintenance of way of the Louisville & Nash-

(Continued on page 898)

Isn't Prefabrication WITH PLYWOOD the answer to many of your construction problems?

Prefabrication with Plywood has these advantages over conventional construction

1. Shop work can be systematized. It is much faster than field work, and no time is lost on account of bad weather.

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WALL SECTIONS OF PREFABRICATED STRUCTURES are quickly and accurately assembled on table jigs. This particular scene was taken in the factory of Green's Ready-Built Homes, Rockford, Ill., but it shows a method used by many prefabricators.

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THE FARM SECURITY ADMINISTRATION has just completed 14 semi-prefabricated, demountable dormitories to house 1000 defense workers in San Diego. Constructed entirely of Douglas Fir Plywood, these dormitories were ready for occupancy in half the scheduled time.

● You prefabricate your freight and passenger cars to a very large extent—*so why not your buildings?* Of course, you will enjoy maximum speed and economy when you have a number of structures of similar size and design to build. But by using Douglas Fir Plywood, you can prefabricate any building to good advantage.

Douglas Fir Plywood is by far the favorite material for prefabricated structures. Over 1000 residences a month—each containing plywood as a basic structural material—are being built by the nation's leading prefabricators. Plywood's pre-eminence in this field is due to its unusual and well-established structural properties, its large panel size, and the ease with which attractive yet economical finishes may be applied. Douglas Fir Plywood is an extremely tough, durable, yet lightweight panel that is virtually "kick-proof" and "scuff-proof." There is a type or grade, size and thickness for every structural purpose, and each can be applied with a minimum of labor.

Each prefabricator has his own methods, but one tested method available to all without restriction or royalty is the DFP Dri-Bilt with Plywood method of construction. A manual describing it will be sent free upon request.

Also available without charge is a 16-page book that describes prefabrication with plywood in detail and contains illustrations of the plywood structures being built by prefabricators from coast to coast. Write for your copy today. Douglas Fir Plywood Assn., Tacoma, Washington.

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EXT.-D.F.P.A.

GENUINE PLYSCORD SHEATHING D.F.P.A.

ville, with headquarters at Louisville, Ky., died on October 25 at his home in Elizabethtown, Ky. Mr. Burns was born at St. Clairsville, Ohio, on November 29, 1869, and graduated from Ohio State University in 1891. He entered railway service in the same year as a draftsman in the office of the chief engineer of the Louisville & Nashville. A year later he was appointed masonry inspector on bridge construction and in 1893 he was advanced to assistant engineer on the old Memphis line of the L. & N. Mr. Burns served as assistant engineer until 1902, when he was promoted to roadmaster, with headquarters at Lebanon, Ky., later being transferred to Elizabethtown, where he remained until 1913, when he was advanced to assistant engineer maintenance of way, with headquarters at Louisville. Mr. Burns retained that position until his retirement.

Lardner V. Morris, former chief engineer of the Long Island, died at his home in Bristol, Pa., on November 15, at the age of 71. Mr. Morris was born at Bristol on July 17, 1870, and was educated at the Cheltenham Military Academy and at the Rittenhouse Academy in Pennsylvania. He started his career as a rodman in January, 1889, in connection with the survey and construction of the Confluence & Oakland, along the Youghiogheny river in western Maryland. In 1890 he entered the engineering department of the Pennsylvania, serving in various capacities until 1902, including that of assistant engineer. In May, 1902, Mr. Morris became engineer in charge of special improvements for the reconstruction of the Long Island (subsidiary of the Pennsylvania), being assigned, in 1904, to the surveys and construction of the Bay Ridge Improvements, an undertaking in Brooklyn involving the building of four-track tunnels, the abolition of many grade crossings and the elevation and depression of tracks. He later became chief engineer of these improvements. While the latter work was in progress, Mr. Morris also assisted the chief engineer of the Long Island in connection with the extensive Jamaica Improvement project, having had charge of all plans, surveys and designs. In addition to his other duties, Mr. Morris was appointed valuation engineer of the Long Island in 1914, in which capacity he collaborated with the Valuation Committee of the Interstate Commerce Commission. Mr. Morris served as chief engineer of the Long Island from October 1, 1917, to July 6, 1926, when he became consulting engineer retiring from active service on July 1, 1933.

Frederick A. Feikert, division engineer of the Salt Lake division of the Southern Pacific, with headquarters at Ogden, Utah, whose death on September 27 was reported in the November issue, was born at Orchard, Neb., on November 9, 1886, and entered railway service in 1904 as a bridge carpenter on the Portland division of the Southern Pacific. In 1905 he transferred to the engineering department on the same division as a rodman and in 1907 he went with the Oregon-Washington Railroad & Navigation Company (now part of the Union Pacific) as a rodman on location, later serving as instrumentman and field draftsman. He went with the Northern Pacific in 1908, as a topographer on railway location and also served as a transitman and draftsman. In December, 1909, he returned to the Southern Pacific as an instrumentman and in 1913 was promoted to assistant engineer on the Portland division. In 1918 he entered the Officers Training Camp at the University of Oregon, and later served in the U. S. Army. Returning to the Southern Pacific after the war, he held his former position of assistant engineer until 1922, at which time he was appointed roadmaster on the Coos Bay district of the Portland division. In May, 1923, he returned to the engineering department as assistant engineer, and in July, 1927, he was appointed assistant division engineer, with headquarters at Portland, Ore. On November 1, 1937, he was appointed division engineer on the Rio Grande division, with headquarters at El Paso, Tex., and on October 1, 1940, he was transferred to the Salt Lake division, with headquarters at Ogden. In August, 1941, Mr. Feikert was commissioned a lieutenant-colonel of engineers, United States Army Reserves.

James G. Gwyn, former chief engineer of the Denver & Rio Grande Western at Denver, Colo., died on October 25 at St. Joseph's hospital, Denver, following an emergency stomach operation, at the age of 83. Mr. Gwyn was born at Louisville, Ky., on October 24, 1858, and entered railroad service in December, 1879, with the engineering forces of the Denver & Rio Grande, serving for three years as a member of parties on location and construction in southern Colorado and New Mexico, then advancing to transitman. Mr. Gwyn was next employed on the location and construction of the Tampico branch of the Mexican Central for about three years. Returning to the United States, he was engaged for a short time with the engineering department of the Chicago, Rock Island & Pacific on the extension of their lines into eastern Colorado. He re-entered the service of the Rio Grande on the extension of the main line between Red Cliff, Colo., and Grand Junction and had charge of construction of that part of the road through Glenwood Canyon. Following service under the division engineer at Pueblo, Colo., he was placed in charge of the reconstruction and standard gaging in the Royal Gorge. About two years later he had charge of similar work between Tennessee Pass, Colo., and Minturn. During the depression of 1893 to 1897, Mr. Gwyn was engaged in the location and construction of the Cuernavaca & Pacific in west central Mexico. In 1902 he returned to the Rio Grande in charge of the building of the North Fork of the Gunnison branch from Delta, Colo., to Somerset. In 1904, Mr. Gwyn was placed in charge of the location and construction of the Farmington branch from Durango, Colo., to Farmington, N.M., following which he became assistant chief engineer at Denver. He was appointed chief engineer in 1908, from which position he retired in 1923 because of illness. Mr. Gwyn served as consultant to the president of the Rio Grande during the extensive rehabilitation program of 1923 to 1928 and in 1933 he was placed in charge of the location and construction of the Dotsero cut-off in Colorado.

Association News

Roadmasters' Association

The officers and directors of the association will meet in Chicago on December 8 to canvass the returns from a request for volunteers to serve on committees and to select therefrom the personnel of the committees which will study and report on the subjects that are to receive consideration at the convention next September.

Bridge and Building Association

Members of the Executive committee will meet in Chicago on December 1 to organize the work of the organization for the new year and to select members of committees to study and report on subjects selected at the convention last October. The association has selected the Hotel Stevens as the headquarters for its next annual convention to be held on October 20-22, 1942.

Metropolitan Maintenance of Way Club

At the next meeting of the club, which will be held at the Hotel Governor Clinton, in New York City, at 12:30 p.m. on December 11, the members will hear an account of the effects of bombing raids on English railroads, and of the methods that are employed in repairing damage to tracks and bridges. The speaker will be Walter D. Binger, consulting engineer and chairman of the National Technological Civil Protection Committee, who recently spent 3½ weeks in England in that capacity, investigating various aspects of the problem of civilian defense. In scheduling this meeting for December 11, the club is following its usual practice of holding its December meeting the day of the annual evening dinner of the New York Railroad Club.

Appliances Association

The National Railway Appliances Association has concluded arrangements for the presentation of its thirty-first annual exhibit in the 122nd Field Artillery Armory, 234 East Chicago avenue (one block east of Michigan boulevard), Chicago. This exhibit will be held on March 16-19, 1942, coincident with the convention of the American Railway Engineering Association.

This armory, which has become available to the Appliances Association only within recent months, is much closer to the A.R.E.A. convention headquarters in the Palmer House and, therefore, more convenient for those attending the convention. Furthermore, it will be possible for all of the exhibitors to be housed within one room, an arrangement not heretofore available at the International Amphitheatre where the exhibits have been held in recent years. For these various reasons the officers of the association anticipate that the new location will meet with much favor.

Space contract blanks will be sent to member companies by Charles H. White, secretary (Industrial Brownhoist Corporation, 208 S. LaSalle street, Chicago) be-

(Continued on page 900)

WOODINGS-VERONA TOOL · WORKS

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WOODINGS FORGE & TOOL COMPANY

Been Confronted With Such Opportunities

to Create and Promote Good Will as Now.

Good Will Is Built Principally Through

Pleasant, Honest and Satisfactory Service.

We Want Our Customers to Know

We are Keenly Alive to This Situation.

WOODINGS FORGE *and* TOOL COMPANY

VERONA, PA.

fore December 10. The number of inquiries received to date from companies which have not heretofore exhibited indicates a larger interest in the exhibit than has been experienced in recent years.

Maintenance of Way Club of Chicago

One hundred and fifty-three members and guests attended the meeting of the club on November 24, in the Ambassador room of Huyler's restaurant in the Straus building, Chicago, when H. R. Carter, division engineer, Illinois Central, spoke on Organizing for High-Speed Rail Laying, without sacrifice of quality, and with minimum interference with traffic.

The next meeting of the club, which will be held on December 15, will be addressed by R. J. O'Connor, roadmaster, Chicago, Milwaukee, St. Paul & Pacific, and F. E. Schaumberg, roadmaster, Chicago & North Western, who will discuss the relative advantages of renewing crossties with extra gangs and with regular section forces.

American Railway Engineering Association

Late in November, Bulletin 427 was mailed to members, this bulletin including the reports of six standing committees to be presented at the annual convention next March, as follows: Economics of Railway Location and Operation; Standardization; Signals and Interlocking; Electricity; Waterways and Harbors; and Water Service, Fire Protection and Sanitation. In addition, four standing committees and the Board of Direction and the Nominating committee held meetings, the standing committees including those on Waterproofing of Railway Structures, at New York, on November 6 and 7; Track, at Chicago, on November 13; Economics of Railway Labor, at Chicago, on November 14; and Masonry, at Chicago, on November 24 and 25.

At the meeting of the Board of Direction, which was held in Chicago on November 14, action was taken increasing the price of the Manual, effective January 1, 1942. After that date, the price of the first copy of the Manual to members will be increased from $4 to $5 and the price of additional copies to members, and also to railroads, will be increased from $7 to $8. To all other purchasers of the Manual, copies will cost $12, instead of $10 as heretofore.

With the year's work of committees either completed or drawing to a close, only one committee has scheduled a meeting during December, this being the Committee on Rail, which will meet in Chicago on December 5.

As the results of the action of the Nominating committee at its meeting on November 14, the following names will appear on the ballot for officers to be mailed shortly to members: President, H. R. Clarke, engineer maintenance of way, Chicago, Burlington & Quincy, Chicago; vice-president, F. R. Layng, chief engineer, Bessemer & Lake Erie, Greenville, Pa.; directors (three to be elected), G. L. Sitton, chief engineer maintenance of way and structures, Eastern lines, Southern, Charlotte, N. C.; R. A. Van Ness, bridge engineer, Atchison, Topeka & Santa Fe, Chicago; C. E. Smith, vice-president, New York, New Haven & Hartford, New Haven, Conn.; W. B. Irwin, assistant to vice-president operation, Great Northern, St. Paul, Minn.; John Foley, forester, Pennsylvania, Philadelphia, Pa.; L. P. Kimball, engineer of buildings, Baltimore & Ohio, Baltimore, Md.; J. F. Pringle, general superintendent, Canadian National, Toronto, Ont.; J. E. Teal, transportation engineer, Chesapeake & Ohio, Richmond, Va.; and A. E. Perlman, chief engineer, Denver & Rio Grande Western, Denver, Colo.

For members of the Nominating committee (five to be elected): E. W. Caruthers, assistant engineer, Pennsylvania, Philadelphia, Pa.; D. B. Thompson, mechanical and electrical engineer, New York Central, New York; W. G. Arn, assistant engineer, Illinois Central, Chicago; H. F. King, special engineer, Erie, Cleveland, Ohio; L. L. Adams, engineer maintenance of way, Louisville & Nashville, Louisville, Ky.; J. E. Bernhardt, bridge engineer, Chicago & Eastern Illinois, Chicago; G. M. Strachan, assistant engineer, Atchison, Topeka & Santa Fe, Chicago; E. E. Oviatt, chief engineer, New York, New Haven & Hartford, New Haven, Conn.; A. E. Botts, assistant engineer maintenance of way, Chesapeake & Ohio, Richmond, Va.; and W. J. Hadley, construction engineer, Wabash, St. Louis, Mo.

In addition to the above names to be balloted upon, W. F. Cummings, chief engineer, Boston & Maine, Boston, Mass., will be advanced automatically to the position of senior vice-president.

Wood-Preservers' Association

The program for the thirty-eighth annual convention to be held at the Hotel Nicollet, Minneapolis, Minn., on January 27-29, 1942, is now nearing completion and will be published in the next issue. Plans are being made for those attending the convention to assemble in Chicago and travel to Minneapolis in a group.

Letter Ballots for the election of officers of the association for the ensuing year were mailed to members late in November, these containing the following nominations of the Nominating committee: For president, W. P. Conyers, Jr., vice-president and treasurer, Taylor-Colquitt Company, Spartanburg, S. C.; for first vice-president, R. H. Colley, engineer, Bell Telephone Laboratories, Inc., New York; for second vice-president, W. P. Arnold, technical director, The Wood Preserving Corporation, Orrville, Ohio; for treasurer, H. L. Dawson, secretary-treasurer, American Wood-Preservers' Association, Washington, D. C.; for members of the Executive committee (three to be elected), A. J. Loom, general superintendent, timber preservation and tie treating plants, Northern Pacific, Brainerd, Minn.; R. H. Rawson, consulting timber engineer, Portland, Ore.; and T. A. Wilson, superintendent, timber department, Consolidated Gas, Electric Light & Power Company, Baltimore, Md.; for Nominating committee (six to be elected), H. L. Holderman, superintendent, Escanaba tie treating plant, Chicago & North Western, Escanaba, Mich.; F. W. Kroemer, Bernuth, Lembcke Company, Inc., Houston, Tex.; J. D. MacLean, senior engineer, Forest Products Laboratory, Madison, Wis.; C. W. Osborne, manager, creosoting plant, Pope and Talbot Lumber Co., Portland, Ore.; W. A. Summerhays, manager, Forest Products Inspection & Research Bureau, Illinois Central, Memphis, Tenn.; and W. R. Yeager, inspection engineer, Western Electric Co., New York.

Supply Trade News

General

Layne & Bowler, Inc., Memphis, Tenn., manufacturers of pumping and water service equipment, has recently completed a new all-steel pipe and screen shop.

The Carnegie-Illinois Steel Corporation, subsidiary of the United States Steel Corporation, will begin work immediately on a $15,000,000 expansion program to provide increased steel and iron making capacity at its Gary, Ind., steel works.

Personal

Lt.-Col. P. Wilson Evans, senior vice-president of the **National Aluminate Corporation,** Chicago, has been ordered to active duty by the War department, with headquarters in the U. S. District Engineer's office, San Juan, Porto Rico.

Richard W. Torbert has joined the **Oxweld Railroad Service Company,** a unit of Union Carbide and Carbon Corporation, as assistant chief engineer, with

Richard W. Torbert

headquarters in Chicago. His appointment became effective December 1. Mr. Torbert was born in Ocean City, N.J., on December 1, 1902, and graduated in civil engineering from the University of Delaware in 1926. He entered railroad service in the engineering department of the Reading at Harrisburg, Pa., and was promoted to assistant supervisor of track in November, 1926. He was advanced to supervisor of track in April, 1934, and continued in that capacity at Philadelphia, Pa., and at West Trenton, N.J., until his resignation to accept his new appointment.

Removing "BOTTLENECKS" in TRACK MAINTENANCE

WOOLERY TIE CUTTER ON THE JOB

Cuts tie into three pieces for speedy removal without disturbing the ballast. New ties can be quickly, easily inserted with minimum effort and the laborious "digging-out" of ties is absolutely eliminated.

WOOLERY TIE CUTTER

Eliminates the Time-and-Labor-wasting Practice of "Digging Out" Ties

1942 is going to be a busy year!

The problem of handling the larger maintenance programs with its scarcity of labor can be greatly simplified by the use of Woolery Tie Cutters.

For these machines enable you to get *more* work done, *better, faster,* with *less manpower*—and *at reduced costs.*

Railroads that have used these machines for periods up to five years report—savings of 30% in time and cost of renewing ties—programs finished weeks ahead of schedule—and men released for other important tasks.

Why not let Woolery Tie Cutters do the same for you? Write for further information.

WOOLERY WEED BURNERS

A Speedy, Low-cost Means of Keeping Tracks Clean

Clean track is essential to economical track maintenance.

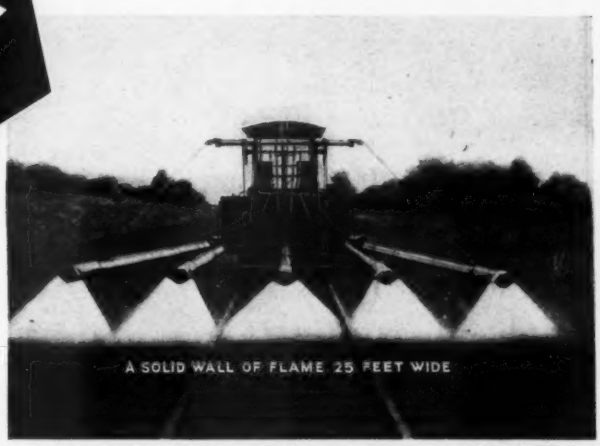
Woolery Weed Burners do a rapid, thorough job of removing track weeds. Three models are available to meet varying needs.

Woolery Giant Octopus for main line track, in 3-burner and 5-burner types.

Midget Octopus. 2-burner type, for branch lines and terminals.

Junior Portable Model—for use on or off track—at highway crossings—and around buildings, storage yards, etc.

Woolery Weed Burners are saving money and simplifying track maintenance on more than 60 roads in the United States and foreign countries. Write for information.



A SOLID WALL OF FLAME 25 FEET WIDE

WOOLERY GIANT OCTOPUS IN ACTION. Flexibility is an important feature of this machine; flames can be directed down embankments, into ditches, up faces of cuts and will burn to a width of 25 feet at one trip; in addition to this, outer arms can be swung out to burn a total width of 35 feet.

WOOLERY MACHINE COMPANY

MINNEAPOLIS Pioneer Manufacturers of MINNESOTA

RAILWAY MAINTENANCE EQUIPMENT

TIE CUTTERS • SWITCH HEATERS • MOTOR CARS

RAILWAY WEED BURNERS • BOLT TIGHTENERS

TO RAILWAY SUPPLY MANUFACTURERS

"Big Figures"

Kansas City Southern

General headquarters. System engineering officers

Division headquarters. Division engineers

Roadmasters headquarters

Railway Engineering and Maintenance Goes Every Month to the **Executive Vice-President,** the **Chief Engineer,** the **Engineer Maintenance of Way,** the **Three Division Engineers,** the **Five Roadmasters** and to **Two Other Subordinate Officers** Who Are in Training for Promotion to Supervisory Positions on the Kansas City Southern.

"Boss, the railways are certainly thinking in big figures these days," said the star railway salesman to his railway sales manager.

"In the budgets they're making, Bill?" countered the sales manager.

"That's what I mean. They're getting ready to clean up a lot of their back maintenance—and they're dusting off long-postponed plans for improvements too. They're certainly getting ready to spend while the money's coming in."

"The railways always do that, Bill. They put their reserves into their properties rather than in a bank. But even more, Bill, they're getting ready for still heavier traffic next year."

"You mean they can't afford to take a chance of falling down when our national program is 'all out for defense.'"

"That's it, Bill. No defense program is better than its railways. They're as vital as the Army."

"That's right. And their programs ought to make a big year for us."

"They will, Bill—and we're getting ready too."

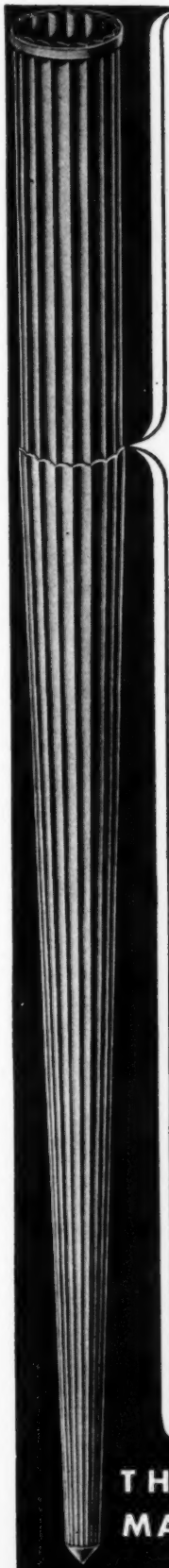
"Does that include our advertising in *Railway Engineering and Maintenance,* Boss?"

"Certainly, why do you ask that question?"

"Because I want to be sure. You know that campaign's as important to me as my right arm. It keeps our materials before these railway officers all the time. They're waiting for me when I come around. No delays telling them about our products. They're ready to do business."

"Fine, Bill—we're not only going to renew—we're going to increase our space. The bigger the market, the harder you work and the larger is the advertising program that you need to back you up."

RAILWAY ENGINEERING AND MAINTENANCE IS READ BY MAINTENANCE OFFICERS OF ALL RANKS



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OFFER YOU IMPORTANT ECONOMIES

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ELIMINATE WASTE

The Monotube Method provides cast-in-place concrete piles of the exact length to meet each job requirement. After driving the main lower tapered section, constant taper extensions are added to obtain the necessary total length. Installation is simple and speedy. Any number of extensions, which are available in 12″, 14″, 16″ and 18″ diameters, can be added in this manner. Extendable Monotubes up to 125 ft. in length have been installed successfully.

PERMIT DRIVING IN LOW HEADROOM

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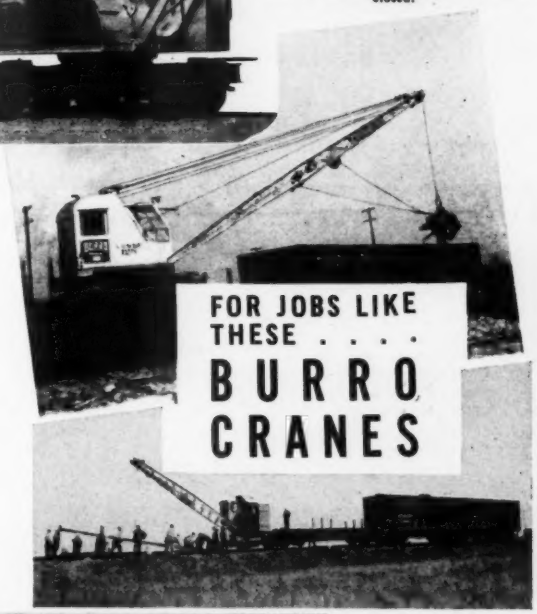
Rear end of cab with doors and radiator shutter open. Note easy access to engine.

View of rear end of cab with doors closed.



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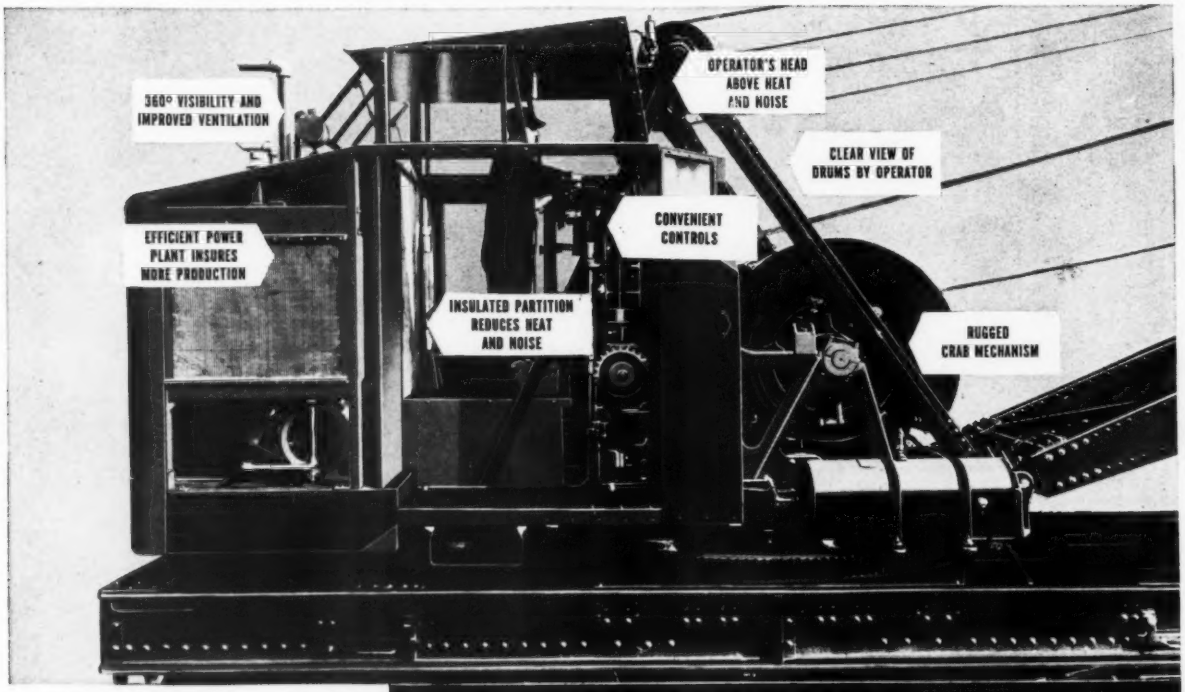
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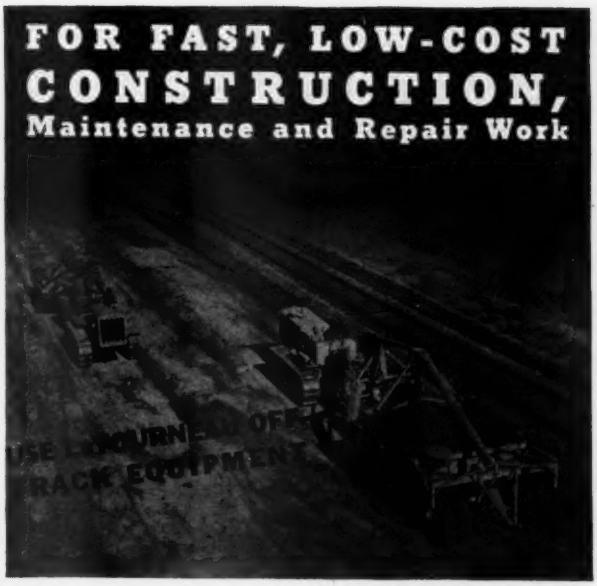

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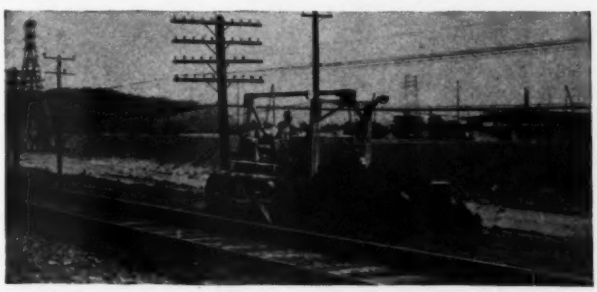

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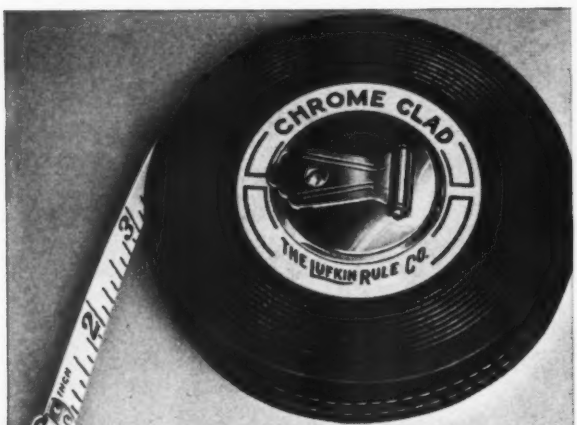

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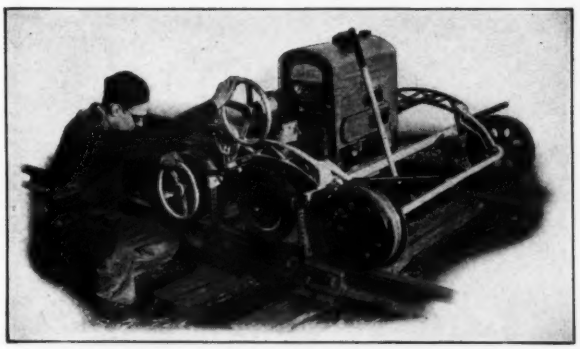

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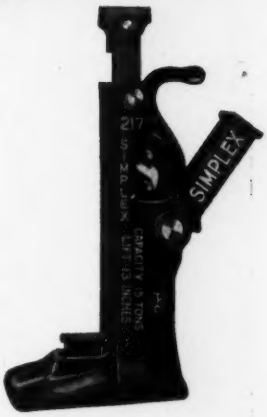

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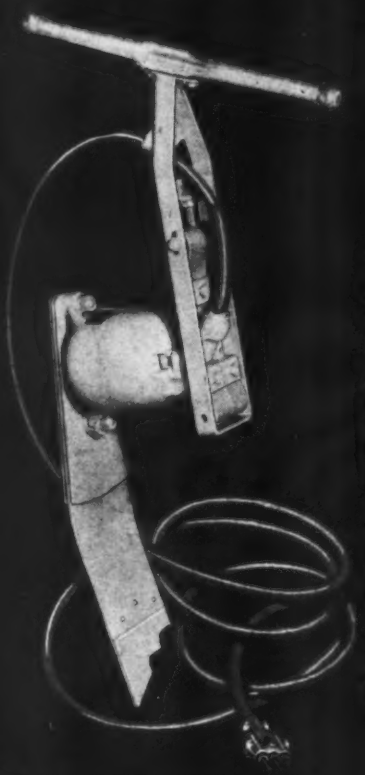

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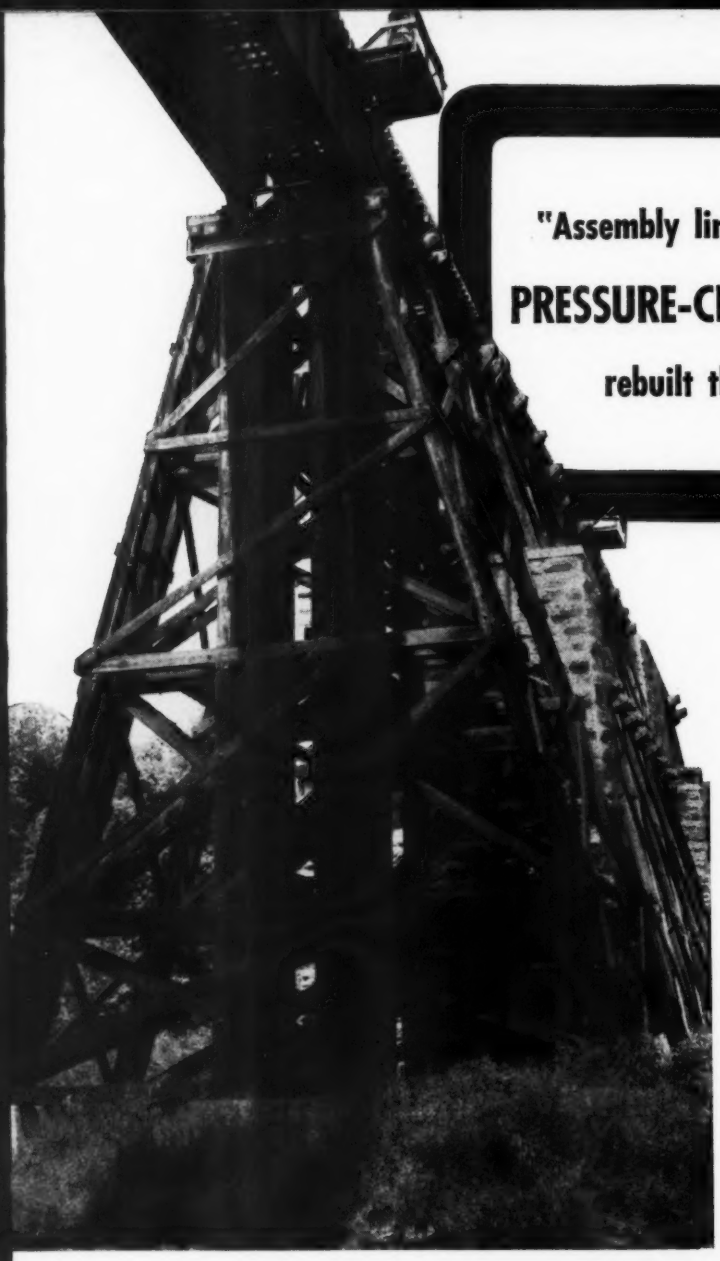

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